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Figure 1: construction of a synthetic human antibody library based on consensus sequences

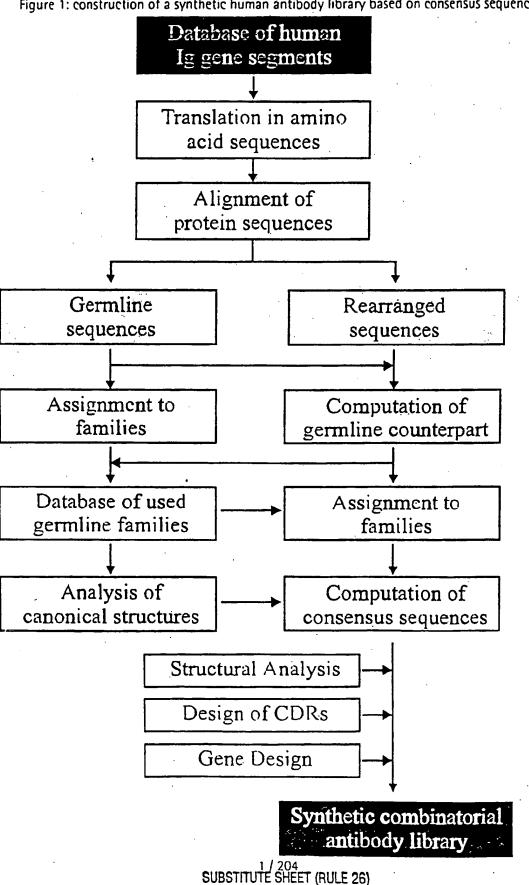


Figure 2A: VL kappa consensus sequences

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Figure 2A: VL kappa consensus sequences

Figure 2B: VL lambda consensus sequences

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Figure 2B: VL lambda consensus sequences

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Figure 3B: V kappa 2 (Vk2) gene sequence

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CGGATCGTTT GCCTAGCAAA AGTGGGGTCC TCACCCCAGG CAACCGTGCC GTTGGCACGG ATCTGGGCAG TAGACCCGTC CTATTAATTT GATAATTAAA

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Figure 38: V kappa 2 (Vk2) gene sequence (continued)

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G S BamHI	GGATCCGGCA CCTAGGCCGT
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Ω	TAGCGGCTCT ATCGCCGAGA

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TACCACCCG ATGGTGGGGC AGCAGCATTA TCGTCGTAAT ATAATAACGG TATTATTGCC CGTGGGCGTG GCACCCGCAC AAGCTGAAGA TTCGACTTCT

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GCGCGTTTTA GCGGCTCTGG BamHI TGGGGTCCCG ~~~~~ SanDI GCCGTGCAAC GGCGCGAGCA

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Figure 3C: V kappa 3 (Vx3) gene sequence (continued)

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Figure 3D: V kappa 4 (Vk4) gene sequence

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AGGGCCTAGC TCCCGGATCG GAAAGCGGGG CTTTCGCCCC ATCCACCCGT TAGGTGGCCA TTTATTGGGC AAATAACCCG AAACTATTAA TTTGATAATT

Figure 3D: V kappa 4 (VK4) gene sequence (continued)

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R S	TTTTAGCGGC AAAATCGCCG	L Q A E		TGCAAGCTGA ACGTTCGACT
	TT: AA2	ī		TGC

GTACG CATGC GAAATTAAAC CTTTAATTTG TACGAAAGTT ATGCTTTCAA TTGGCCAGGG AACCGGTCCC GGCGGCTGGA CCGCCGACCT

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igure 4A. V lambda 1 (Vλ.1) gene sequence Q S V L T Q P P S V S G A P G Q R SexAI	CAGAGCGTGC TGACCCAGCC GCCTTCAGTG AGTGGCGCAC CAGGTCAGCG GTCTCGCACG ACTGGGTCGG CGGAAGTCAC TCACCGCGTG GTCCAGTCGC Eco571	VT I S C S G S S N I G S N Y BssSI	TGTGACCATC TCGTGTAGCG GCAGCAGCAG CAACATTGGC AGCAACTATGACACTGGTAG AGCACATCGC CGTCGTCGTC GTTGTAACCG TCGTTGATAC	E	TGAGCTGGTA CCAGCAGTTG CCCGGGACGG CGCCGAAACT GCTGATTTAT ACTCGACCAT GGTCGTCAAC GGGCCCTGCC GCGGCTTTGA CGACTAAATA	D N N Q R P S G V P D R F S G S K Bsu361	

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AGCGTCCCTC TCGCAGGGAG	SASL	AGCGCGAGCC	Y C Q TTATTGCCAG AATAACGGTC	L T V HpaI	AGTTAACCGT TCAATTGGCA
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Figure 4B: V lambda 2 (VA2) gene sequence	Q	CAGAGCGCAC GTCTCGCGTG	H	CATTACCATC GTAATGGTAG	<b>&gt;</b> -	ATGTGAGCTG TACACTCGAC	<b>&gt;</b>	TATGATGTGA ATACTACACT
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Figure 4C: V lambda 3 (VA3) gene sequence

T Q P P S V S V A P G Q T SexAI	~~~~~ CAGGTCAGAC GTCCAGTCTG	נח	TACGCGAGCT ATGCGCTCGA	Q	TTATGATGAT AATACTACTA
Q	CAC	DALGDKYAS	GAC	Q A P V L V I Y D D Bbei	ATC TAC
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ω	AGCTATGAAC TCGATACTTG	K	CGCGCGTATC GCGCGCATAG	W Y Q Q KpnI	GGTACCAGCA

Figure 4C: V lambda 3 (VA.3) gene sequence (continued)

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heavy chain 1A (VI V Q L M£eI	1	>	AGTG ICAC	> >	SGGT	H	н
Figure 5A: V heavy chain 1A (VH1A) gene sequence Q V Q L V Q M£eI	CAGGTGCAAT GTCCACGTTA	V K V	CGTGAAAGTG GCACTTTCAC	S N	TTAGCTGGGT AATCGACCCA	I I P ATTATTCCGA TAATAAGGCT	V T BstEII
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Figure 5A: V heavy chain 1.A (VH1A) gene sequence (continued)

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Figure 58: V heavy chain 18 (VH1B) gene sequence

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K TTCAGGGCCG AAGTCCCGGC U Ø CGCGTCTTCA GCGCAGAAGT Q GTGCTTGATG CACGAACTAC Z ATAGCGGCGG TATCGCCGCC C G ഗ Z TAATTGGGCT ATTAACCCGA

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Figure 58: V heavy chain 18 (VH18) gene sequence (continued)

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H Ø Н Д  $\simeq$ > 口 K Д G ഗ Figure 5C: V heavy chain 2 (VH2) gene sequence 团 Н MfeI >

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CGCGCGTTGG GCGCGCAACC CCTATTATTG GGATAATAAC GATACGGCCA CTATGCCGGT GGACCCGGTG CCTGGGCCAC ACTGGTTGTA TGACCAACAT

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GCACCCTGGT CGTGGGACCA TGGGGCCAAG ACCCCGGTTC GATGGATTAT CTACCTAATA CGAAAATACG GCTTTTATGC GGCGCGATG CCGCCGCTAC

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AGTC TCAG GACGGTTAGC CTGCCAATCG

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Figure 5D: V heavy chain 3 (VH3) gene sequence

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GCCGCCGTC CGGGGGGCAG GACCACGTTG CTGGTGCAAC ACCACCTTTC GCCGCCGCG 2552552552 TGGTGGAAAG GAAGTGCAAT CTTCACGTTA

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GGTGAGCGCG CCACTCGCGC CAGAGCTCAC GTCTCGAGTG GGACCCTTCC CCTGGGAAGG GCGCCAAGCC CGCGGTTCGG TGAGCTGGGT ACTCGACCCA

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Figure 5D: V heavy chain 3 (VH3) gene sequence (continued)

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Figure 5E: V heavy chain 4 (VH4) gene sequence

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×	CTGGTGAAAC GACCACTTTG	ß	CAGCATTAGC GTCGTAATCG	M	GTCTCGAGTG CAGAGCTCAC	H.	CCGAGCCTGA GGCTCGGACT
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Figure 5E: V heavy chain 4 (VH4) gene sequence (continued)

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Figure 5F: V heavy chain 5 (VH5) gene sequence	>		<b>₹</b>	TGGTTCAGAG	ACCAAGTCTC
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AGCTATTGGA TCGATAACCT TTCCTTTACG AAGGAAATGC GTTCCGGATA CAAGGCCTAT AGCTGCAAAG TCGACGTTTC GGACTTTTAA CCTGAAAATT

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CTACCCGTAA GATGGGCATT CAGAGCTCAC GTCTCGAGTG GGACCCTTCC CCTGGGAAGG GCGCCAGATG CGCGGTCTAC AACCGACCCA TTGGCTGGGT

TCTCCGAGCT TTCAGGGCCA AAGTCCCGGT Ø AGAGGCTCGA TACCCGTTAT ATGGGCAATA **M** GCGATAGCGA ഗ Ω G ATTTATCCGG TAAATAGGCC Ы

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3 Ø Ø Н S ഗ Figure 5F: V heavy chain 5 (VH5) gene sequence (continued)  $\mathbf{X}$ Ø S  $\vdash$ BstEII CTTCAATGGA GAAGTTACCT GTGGCGCATA CACCGCGTAT TTTCGTAATC AAAGCATTAG AGCGCGGATA TCGCGCCTAT CCACTGGTAA GGTGACCATT

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CGCAACCCCG ATTATIGCGC GCGTIGGGGC TAATAACGCG CGTCGGACTT TCGCTCGCTA TGCCGGTACA ACGGCCATGT GCAGCCTGAA AGCGAGCGAT

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GGGACCACTG CCCTGGTGAC GGCCAAGGCA CCGGTTCCGT GGATTATTGG CCTAATAACC AAATACGCTA TTTATGCGAT CCGCTACCGA GGCGATGGCT

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GGTTAGCTCA CCAATCGAGT

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Figure 5G: V heavy chain 6 (VH6) gene sequence

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CGAGTGGCTG GCTCACCGAC CCGCACCGGA GGCGTGGCCT CTGGATTCGC CAGTCTCCTG GTCAGAGGAC GACCTAAGCG CGGCGTGGAA GCCGCACCTT

CGGTGAGCGT GCCACTCGCA ഗ > Ø TTGCTAATAC AACGATTATG Ω Z CAAATGGTAT GTTTACCATA 3 ATTATCGTAG TAATAGCATC 24 CCGGCATGGA GGCCGTACCT . T

O H S	CAGTTTAGCC GTCAAATCGG	Y C A BSSHII	TTATTGCGCG
Figure 5G: V heavy chain 6 (VH6) gene sequence (continued)  K S R I T I N P D T S K N Q F S  BSABI	GAAAAGCCGG ATTACCATCA ACCCGGATAC TTCGAAAAAC CTTTTCGCC TAATGGTAGT TGGGCCTATG AAGCTTTTG	L Q L N S V T P E D T A V Y C A Eagl BssHI	TGCAACTGAA CAGCGTGACC CCGGAAGATA CGGCCGTGTA TTATTGCGCG

GCCAAGGCAC CGGTTCCGTG GATTATTGGG TTATGCGATG AATACGCTAC GCGATGGCTT CGCTACCGAA CGTTGGGGCG GCAACCCCGC

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CCTGGTGACG GTTAGCTCAG GGACCACTGC CAATCGAGTC

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Figure 6: oligonucleotides for gene synthesis

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- **O1K1** 5'- GAATGCATACGCTGATATCCAGATGACCCAGAG-CCCGTCTAGCCTGAGC -3'
- **O1K2** 5'- CGCTCTGCAGGTAATGGTCACACGATCACCCAC-GCTCGCGCTCAGGCTAGACGGC -3'
- **01K3** 5'- GACCATTACCTGCAGAGCGAGCCAGGGCATTAG-CAGCTATCTGGCGTGGTACCAGCAG -3'
- **01K4** 5'- CTTTGCAAGCTGCTGCTGCATAAATTAATAGT-TTCGGTGCTTTACCTGGTTTCTGCTGGTACCACGCCAG -3'
- **01K5** 5'- CAGCCAGCAGCTTGCAAAGCGGGGTCCCGTCCC-GTTTTAGCGGCTCTGGATCCGGCACTGATTTTAC -3'
- O1K6 5'- GATAATAGGTCGCAAAGTCTTCAGGTTGCAGGC-TGCTAATGGTCAGGGTAAAATCAGTGCCGGATCC -3'
- **O2K1** 5'- CGATATCGTGATGACCCAGAGCCCACTGAGCCT-GCCAGTGACTCCGGGCGAGCC -3'
- **O2K2** 5'- GCCGTTGCTATGCAGCAGGCTTTGGCTGCTTCT-GCAGCTAATGCTCGCAGGCTCGCCCGGAGTCAC -3'
- O2K3 5'- CTGCTGCATAGCAACGGCTATAACTATCTGGAT-TGGTACCTTCAAAAACCAGGTCAAAGCCC -3'
- **O2K4** 5'- CGATCCGGGACCCCACTGGCACGGTTGCTGCCC-AGATAAATTAATAGCTGCGGGCTTTGACCTGGTTTTTG -3'
- **O2K5** 5'- AGTGGGGTCCCGGATCGTTTTAGCGGCTCTGGA-TCCGGCACCGATTTTACCCTGAAAATTAGCCGTGTG -3'
- **O2K6** 5'- CCATGCAATAATACACGCCCACGTCTTCAGCTT-CACACGCCTAATTTTCAGGG -3'
- O3K1 5'- GAATGCATACGCTGATATCGTGCTGACCCAGAG-CCCGG -3'
- O3K2 5'- CGCTCTGCAGCTCAGGGTCGCACGTTCGCCCGG-AGACAGGCTCAGGGTCGCCGGGCTCTGGGTCAGC -3'
- O3K3 5'- CCCTGAGCTGCAGAGCGAGCCAGAGCGTGAGCA-GCAGCTATCTGGCGTGGTACCAG -3'

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Figure 6: (continued)

- O3K4 5'- GCACGGCTGCTCGCGCCATAAATTAATAGACGC-GGTGCTTGACCTGGTTTCTGCTGGTACCACGCCAGATAG -3'
- O3K5 5'- GCGCGAGCAGCCGTGCAACTGGGGTCCCGGCGC-GTTTTAGCGGCTCTGGATCCGGCACGGATTTTAC -3'
- O3K6 5'- GATAATACACCGCAAAGTCTTCAGGTTCCAGGC-TGCTAATGGTCAGGGTAAAATCCGTGCCGGATC -3'
- **04K1** 5'- GAATGCATACGCTGATATCGTGATGACCCAGAG-CCCGGATAGCCTGGCG -3'
- **04K2** 5'- GCTTĆTGCAGTTAATGGTCGCACGTTCGCCCAG-GCTCACCGCCAGGCTATCCGGGC -3'
- **O4K3** 5'- CGACCATTAACTGCAGAAGCAGCCAGAGCGTGC-TGTATAGCAGCAACAACAAAAACTATCTGGCGTGGTACCAG -3'
- **O4K4** 5'- GATGCCCAATAAATTAATAGTTTCGGCGGCTGA-CCTGGTTCTGCTGGTACCACGCCAGATAG -3'
- **O4K5** 5'- AAACTATTAATTTATTGGGCATCCACCCGTGAA-AGCGGGGTCCCGGATCGTTTTAGCGGCTCTGGATCCGGCAC-3'
- **O4K6** 5'- GATAATACACCGCCACGTCTTCAGCTTGCAGGG-ACGAAATGGTCAGGGTAAAATCAGTGCCGGATCCAGAGCC -3'
- **O1L1** 5'- GAATGCATACGCTCAGAGCGTGCTGACCCAGCC-GCCTTCAGTGAGTGG -3'
- **O1L2** 5'- CAATGTTGCTGCTGCTGCCGCTACACGAGATGG-TCACACGCTGACCTGGTGCGCCACTCACTGAAGGCGGC -3'
- **O1L3** 5'- GGCAGCAGCAGCAACATTGGCAGCAACTATGTG-AGCTGGTACCAGCAGTTGCCCGGGAC -3'
- **O1L4** 5'- CCGGCACGCCTGAGGGACGCTGGTTGTTATCAT-AAATCAGCAGTTTCGGCGCCGTCCCGGGCAACTGC -3'
- **O1L5** 5'- CCCTCAGGCGTGCCGGATCGTTTTAGCGGATCC-AAAAGCGGCACCAGCGCGAGCCTTGCG -3'

Figure 6: (continued)

- O1L6 5'- CCGCTTCGTCTTCGCTTTGCAGGCCCGTAATCGCAAGGCTCGCGCTGG -3'
- **O2L1** 5'- GAATGCATACGCTCAGAGCGCACTGACCCAGCC-AGCTTCAGTGAGCGGC -3'
- **O2L2** 5'- CGCTGCTAGTACCCGTACACGAGATGGTAATGC-TCTGACCTGGTGAGCCGCTCACTGAAGCTGG -3'
- **O2L3** 5'- GTACGGGTACTAGCAGCGATGTGGGCGGCTATA-ACTATGTGAGCTGGTACCAGCAGCATCCCGG -3'
- **O2L4** 5'- CGCCTGAGGGACGGTTGCTCACATCATAAATCA-TCAGTTTCGGCGCCTTCCCGGGATGCTGCTGGTAC -3'
- **O2L5** 5'- CAACCGTCCCTCAGGCGTGAGCAACCGTTTTAG-CGGATCCAAAAGCGGCAACACCGCGAGCC -3'
- **O2L6** 5'- CCGCTTCGTCTTCCGCTTGCAGGCCGCTAATGG-TCAGGCTCGCGGTGTTGCCG -3'
- **O3L1** 5'- GAATGCATACGCTAGCTATGAACTGACCCAGCC-GCCTTCAGTGAGCG -3'
- O3L2 5'- CGCCCAGCGCATCGCCGCTACACGAGATACGCG-CGGTCTGACCTGGTGCAACGCTCACTGAAGGCGGC -3'
- O3L3 5'- GGCGATGCGCTGGGCGATAAATACGCGAGCTGG-TACCAGCAGAAACCCGGGCAGGCGC -3'
- O3L4 5'- GCGTTCCGGGATGCCTGAGGGACGGTCAGAATC-ATCATAAATCACCAGAACTGGCGCCTGCCCGGGTTTC -3'
- **O3L5** 5'- CAGGCATCCCGGAACGCTTTAGCGGATCCAACA-GCGCGACACCCTGACCATTAGCGG -3'
- O3L6 5'- CCGCTTCGTCTTCCGCCTGAGTGCCGCTAATGG-TCAGGGTC -3'
- O1246H1 5'- GCTCTTCACCCCTGTTACCAAAGCCCAG-GTGCAATTG -3'
- **O1AH2** 5 ' GGCTTTGCAGCTCACTTTCACGCTGCTGCCCGG-TTTTTTCACTTCCGCGCCAGACTGAACCAATTGCACCTGGGC-TTTG -3'

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Figure 6: (continued)

**O1AH3** 5 '- GAAAGTGAGCTGCAAAGCCTCCGGAGGCACTTT-TAGCAGCTATGCGATTAGCTGGGTGCGCCAAGCCCCTGGGCAGGCTC -3 '

- Olah4 5'- GCCCTGAAACTTCTGCGCGTAGTTCGCCGTGCC-AAAAATCGGAATAATGCCGCCCATCCACTCGAGACCCTGCCC-AGGGCC -3'
- **O1AH5** 5 '- GCGCAGAAGTTTCAGGGCCGGGTGACCATTACC-GCGGATGAAAGCACCAGCACCGCGTATATGGAACTGAGCAGCCTGCG -3 '
- **Olabh6** 5'- GCGCGCAATAATACACGGCCGTATCTTCGCT-ACGCAGGCTGCTCAGTTCC -3'
- **01BH2** 5 ' GGCTTTGCAGCTCACTTTCACGCTCGCGCCCGG-TTTTTTCACTTCCGCGCCGCTCTGAACCAATTGCACCTGGGC-TTTG -3'
- **01BH4** 5 '- GCCCTGAAACTTCTGCGCGTAGTTCGTGCCGCC-GCTATTCGGGTTAATCCAGCCCATCCACTCGAGACCCTGCCCAGGGGC -3 '
- **01BH5**5'- GCGCAGAAGTTTCAGGGCCGGGTGACCATGACC-CGTGATACCAGCATTAGCACCGCGTATATGGAACTGAGCAGCCTGCG -3'
- **O2H2** 5'- GGTACAGGTCAGGGTCAGGGTTTGGGTCGGTTT-CACCAGGGCCGGCCGCTTTCTTTCAATTGCACCTGGGCTTTG-3'
- **O2H3** 5'- CTGACCCTGACCTGTACCTTTTCCGGATTTAGC-CTGTCCACGTCTGGCGTTGGCGTGGGCTGGATTCGCCAGCCGCCTGGGAAAG -3'
- **O2H4** 5'- GCGTTTTCAGGCTGGTGCTATAATACTTATCAT-CATCCCAATCAATCAGAGCCAGCCACTCGAGGGCTTTCCCAGGCGCTGG -3'

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Figure 6: (continued)

- O2H5 5'- GCACCAGCCTGAAAACGCGTCTGACCATTAGCA-AAGATACTTCGAAAAATCAGGTGGTGCTGACTATGACCAACAT GG -3'
- **02H6** 5'- GCGCGCAATAATAGGTGGCCGTATCCACCGGGT-CCATGTTGGTCATAGTCAGC -3'
- O3H1 5'- CGAAGTGCAATTGGTGGAAAGCGGCGGCCT-GGTGCAACCGGGCGCAG -3'
- O3H2 5'- CATAGCTGCTAAAGGTAAATCCGGAGGCCGCGC-AGCTCAGACGCAGGCTGCCGCCCGGTTGCAC -3'
- O3H3 5'- GATTTACCTTTAGCAGCTATGCGATGAGCTGGG-TGCGCCAAGCCCCTGGGAAGGGTCTCGAGTGGGTGAG -3'
- O3H4 5'- GGCCTTTCACGCTATCCGCATAATAGGTGCTGC-CGCCGCTACCGCTAATCGCGCTCACCCACTCGAGACCC -3'
- **O3H5** 5'- CGGATAGCGTGAAAGGCCGTTTTACCATTTCAC-GTGATAATTCGAAAAAACACCCTGTATCTGCAAATGAACAG-3'
- O3H6 5'- CACGCGCGCAATAATACACGGCCGTATCTTCCG-CACGCAGGCTGTTCATTTGCAGATACAGG -3'
- **04H2** 5'- GGTCAGGCTCAGGGTTTCGCTCGGTTTCACCAG-GCCCGGACCACTTTCTTGCAATTGCACCTGGGCTTTG -3'
- **O4H3** 5'- GAAACCCTGAGCCTGACCTGCACCGTTTCCGGA-GGCAGCATTAGCAGCTATTATTGGAGCTGGATTCGCCAGCCGC-3'
- **O4H4** 5'- GATTATAGTTGGTGCTGCCGCTATAATAAATAT-AGCCAATCCACTCGAGACCCTTCCCAGGCGGCTGGCGAATCCAGG-3'
- **O4H5** 5'- CGGCAGCACCAACTATAATCCGAGCCTGAAAAG-CCGGGTGACCATTAGCGTTGATACTTCGAAAAACCAGTTTAGCCTG -3'
- **O4H6** 5'- GCGCGCAATAATACACGGCCGTATCCGCCGCCG-TCACGCTGCTCAGGTTTCAGGCTAAACTGGTTTTTCG -3'

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Figure 6: (continued)

**O5H1** 5'- GCTCTTCACCCCTGTTACCAAAGCCGAAGTGCA-ATTG -3'

- **O5H2** 5'- CCTTTGCAGCTAATTTTCAGGCTTTCGCCCGGT-TTTTTCACTTCCGCGCCGCTCTGAACCAATTGCACTTCGGCTTTGG -3'
- **O5H4** 5'- CGGAGAATAACGGGTATCGCTATCGCCCGGATA-AATAATGCCCATCCACTCGAGACCCTTCCCAGGCATCTGGCGCAC -3'
- **O5H5** 5'- CGATACCCGTTATTCTCCGAGCTTTCAGGGCCA-GGTGACCATTAGCGCGGATAAAAGCATTAGCACCGCGTATCTTC-3'
- **O5H6** 5'- GCGCGCAATAATACATGGCCGTATCGCTCGCTT-TCAGGCTGCTCCATTGAAGATACGCGGTGCTAATG -3'
- **O6H2** 5'- GAAATCGCACAGGTCAGGCTCAGGGTTTGGCTC-GGTTTCACCAGGCCCGGACCAGACTGTTGCAATTGCACCTGG-GCTTTG -3'
- **O6H3** 5'- GCCTGACCTGTGCGATTTCCGGAGATAGCGTGA-GCAGCAACAGCGCGGGGGGAACTGGATTCGCCAGTCTCCTGGGCG-3'
- **O6H4** 5'- CACCGCATAATCGTTATACCATTTGCTACGATA-ATAGGTACGGCCCAGCCACTCGAGGCCACGCCCAGGAGACTG-GCG -3'
- **O6H5** 5'- GGTATAACGATTATGCGGTGAGCGTGAAAAGCC-GGATTACCATCAACCCGGATACTTCGAAAAACCAGTTTAGCCTGC -3'
- **O6H6** 5'- GCGCGCAATAATACACGGCCGTATCTTCCGGGG-TCACGCTGTTCAGTTGCAGGCTAAACTGGTTTTTC -3'
- OCLK15'- GGCTGAAGACGTGGGCGTGTATTATTGCCAGCA-GCATTATACCACCCCGCCGACCTTTGGCCAGGGTAC -3'

Figure 6: (continued)

- OCLK25'- GCGGAAAAATAAACACGCTCGGAGCAGCCACCG-TACGTTTAATTTCAACTTTCGTACCCTGGCCAAAGGTC -3'
- OCLK3 5'- GAGCGTGTTTATTTTTCCGCCGAGCGATGAACA-ACTGAAAAGCGGCACGGCGAGCGTGGTGTCCTGCTG -3'
- OCLK4 5 ' CAGCGCGTTGTCTACTTTCCACTGAACTTTCGC-TTCACGCGGATAAAAGTTGTTCAGCAGGCACACCACGC -3 '
- OCLK5 5 '- GAAAGTAGACAACGCGCTGCAAAGCGGCAACAG-CCAGGAAAGCGTGACCGAACAGGATAGCAAAGATAG -3 '
- OCLK6 5 ' GTTTTTCATAATCCGCTTTGCTCAGGGTCAGGG-TGCTGCTCAGAGAATAGGTGCTATCTTTGCTATCCTGTTCG - 3 '
- OCLK75'- GCAAAGCGGATTATGAAAAACATAAAGTGTATG-CGTGCGAAGTGACCCATCAAGGTCTGAGCAGCCCGGTG -3'
- OCLK85'- GGCATGCTTATCAGGCCTCGCCACGATTAAAAG-ATTTAGTCACCGGGCTGCTCAGAC -3'
- OCH1 5'- GGCGTCTAGAGGCCAAGGCACCCTGGTGACGGT-TAGCTCAGCGTCGAC -3'
- © 32 5'- GTGCTTTTGCTGCTCGGAGCCAGCGGAAACACG-CTTGGACCTTTGGTCGACGCTGAGCTAACC -3'
- OCH3 5'- CTCCGAGCAGCAAAAGCACCAGCGGCGCACGG-CTGCCCTGGGCTGCCTGGTTAAAGATTATTTCC -3'
- OCH4 5'- CTGGTCAGCGCCCCGCTGTTCCAGCTCACGGTG-ACTGGTTCCGGGAAATAATCTTTAACCAGGCA -3'
- OCH5 5'- AGCGGGGCGCTGACCAGCGGCGTGCATACCTTT-CCGGCGGTGCTGCAAAGCAGCGGCCTG -3'
- OCH6 5'- GTGCCTAAGCTGCTCGGCACGGTCACAACG-CTGCTCAGGCTATACAGGCCGCTGCTTTGCAG -3'
- OCH7 5'- GAGCAGCAGCTTAGGCACTCAGACCTATATTTG-CAACGTGAACCATAAACCGAGCAACACC -3'
- OCH8 5'- GCGCGAATTCGCTTTTCGGTTCCACTTTTTAT-CCACTTTGGTGTTGCTCGGTTTATGG -3'

Figure 7A: sequence of the synthetic Ck gene segment

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GCGATGAACA TTTCCGCCGA CGTGTTTATT CTGCTCCGAG CGTACGGTGG

CGCTACTTGT AACTTTTATC TTGAAAATAG AAAGGCGGCT GGACGACTTG GCGTGGTGTG CCTGCTGAAC CGCACCACAC GCACAAATAA Ö > > S GACGAGGCTC CCGTGCCGCT GGCACGGCGA Ø ₽ G GCATGCCACC ACTGAAAAGC TGACTTTTCG ഗ ×

TGGAAAGTAG ACAACGCGCT GCAAAGCGGC CGTTTCGCCG Ø TGTTGCGCGA Н Ø z Ω ACCTTTCATC > × Z GAAAGTTCAG CTTTCAAGTC > × CGCGTGAAGC GCGCACTTCG Ø 口 ĸ Д

GCACCTATTC CGTGGATAAG ഗ TCGTTTCTAT AGCAAAGATA Ω × ഗ CGAACAGGAT GCTTGTCCTA Ω O দ্র AAAGCGTGAC TTTCGCACTG > ഗ 回 AACAGCCAGG TTGTCGGTCC Ø വ

AAACATAAAG TTTGTATTTC CCTAATACTT GGATTATGAA H Ω ACCCTGACCC TGAGCAAAGC TGGGACTGGG ACTCGTTTCG Ø × ഗ Н TCTGAGCAGC AGACTCGTCG Ŋ ഗ

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TCTTTTAATC GTGGCGAGGC CTGATAAGCA TAGAAAATTAG CACCGCTCCG GACTATTCGT A

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Figure 78: sequence of the synthetic CH1 gene segment

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AGGCTCGTCG TCCGAGCAGC AAGGCGACCG Trcccreec GGTTCGCACA CCAAGCGTGT CTGGTTTCCA GACCAAAGGT CGAGTCGCAG GCTCAGCGTC

TTAAAGATTA CCGACGGACC AATTTCTAAT X > GGCTGCCTGG C L G GGCTGCCCTG CCGACGGGAC A L Ø GCGCGGCAC CGCCGCCGTG G : ტ ഗ TTTTCGTGGT AAAAGCACCA E--ഗ 又

GACTGGTCGC CTGACCAGCG ⊱ GICGCCCCCC CAGCGGGGCG ტ ഗ Z TGAGCTGGAA ACTCGACCTT Z ഗ > GGTCAGTGGC CCAGTCACCG H Д TTTCCCGGAA AAAGGGCCTT 团 Д ш

GTATAGCCTG CATATCGGAC ഗ CGTCGCCGGA GTGCTGCAAA GCAGCGGCCT Ŋ ഗ ഗ CACGACGTTT Ø 口 CTTTCCGGCG GAAAGGCCGC Ø Д GCGTGCATAC CGCACGTATG 工 > G

TCTGGATATA TTAGGCACTC AGACCTATAT Ø AATCCGTGAG [-U GAGCAGCAGC CTCGTCGTCG ഗ ഗ ACTGGCACGG TGACCGTGCC Д > ₽ > TCGTCGCAAC AGCAGCGTTG > S

Figure 7B: sequence of the synthetic CH1 gene segment (continued)

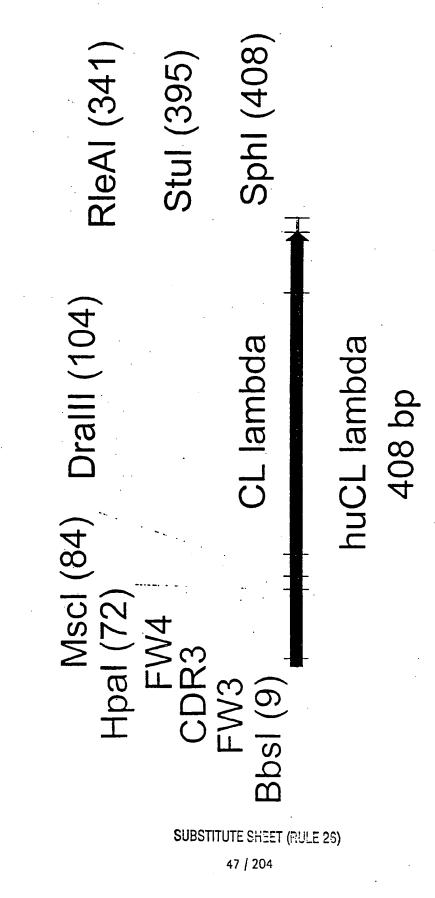
K K V AAAAAAGTGG TTTTTCACC CAAAGTGGAT > AACCATAAAC CGAGCAACAC GCTCGTTGTG Z · ග Д TTGGTATTTG 又 工 TTGCAACGTG AACGTTGCAC Z  $\circ$ 

F P K S E F F

E F \* EcoRI HindIII

AAAG CGAATTCTGA TAAGCTT

AACCGAAAAG CGAATTCTGA TAAGCTT TTGGCTTTTC GCTTAAGACT ATTCGAA Figure 7C: functional map and sequence of module 24 comprising the synthetic CA gene segment (huCL lambda)



GAGACCACCA

GGCGGGAGTG CCGCCCTCAC

GCCCCGTCAA

CGTCTATCGT

CCGGACCTTC

Figure 7C: functional map and sequence of module 24 comprising the synthetic CI gene segment (huCL lambda) (continued)

<b>.</b>	BbsI caagacgaag c cttctgcttc g	CGGATTATTA TTG GCCTAATAAT AAC	TTGCCAGCAG	TACCA	CCCCGCCTGT GGGGCGGACA	
51	GTTTGGCGGC C	GGCACGAAGT TAACCGTTCT		MSCI TGGCCAGCCG ACCGGTCGGC	Draili ~~~ AAAGCCGCAC TTTCGGCGTG	
101	Dralli ~~~~~~ CGAGTGTGAC G GCTCACACTG C	GCTGTTTCCG CCGAGCAGCG AAGAATTGCA CGACAAAGGC GGCTCGTCGC TTCTTAACGT	CCGAGCAGCG	AAGAATTGCA TTCTTAACGT	GGCGAACAAA CCGCTTGTTT	
151	GCGACCCTGG T	TGTGCCTGAT TAG ACACGGACTA ATC	TAGCGACTTT	TATCCGGGAG ATAGGCCCTC	CCGTGACAGT GGCACTGTCA	
201	GGCCTGGAAG G	GCAGATAGCA GCCCCGTCAA	CCGTCAA	GGCGGGAGTG	GAGACCACCA	

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AAGCATGC TTCGTACG

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Figure 7D: oligonucleotides used for synthesis of module M24 containing  ${\sf C}\lambda$  gene segment

## M24: assembly PCR

GCACGAAGTTAACCGTTC

M24-A: GAAGACAAGCGGATTATTATTGCCAGCAGCATTATACCACCCCGCCTGTGTTTGGCGGCG-

M24-B: CAATTCTTCGCTGCTCGGCGGAAACAGCGTCACACTCGGTGCGGCTTTCGGCTGGCCAA-

GAACGGTTAACTTCGTGCCGC

M24-C: CGCCGAGCAGCGAAGAATTGCAGGCGAACAAAGCGACCCTGGTGTGCCTGATTAGCGACT-

TTTATCCGGGAGCCGTGACA

M24-D: TGTTTGGAGGGTGTGGTGGTCTCCACTCCCGCCTTGACGGGGCTGCTATCTGCCTTCCAG-

GCCACTGTCACGGCTCCCGG

M24-E: CCACACCCTCCAAACAAAGCAACAAGAAGTACGCGGCCAGCAGCTATCTGAGCCTGACGC-

CTGAGCAGTGGAAGTCCCACAGAAGCTACAGCTG

M24-F: GCATGCTTATCAGGCCTCAGTCGGCGCAACGGTTTTTCCACGGTGCTCCCCTCATGCGT-

GACCTGGCAGCTGTAGCTTC

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Д Н Figure 8: sequence and restriction map of the synthetic gene encoding the consensus single-chain fragment VH3-VK 2 SapI Н Й Н Ø Ц Ø Н H S O × Σ

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GAAAGCGGCG CTTTCGCCGC CGTTAACCAC GCAATTGGTG TTCTACTTCA AAGATGAAGT GCCGACTACA CGGCTGATGT TGTTACCAAA ACAATGGTTT

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C GCGCCGGAGG CGCGGCCTCC Ø Q GGCAGCCTGC GTCTGAGCTG CAGACTCGAC K > 3 CCGTCGGACG S Σ ď CGTTGGCCCG GCAACCGGGC  $\succ$ ഗ ഗ Ľ GCGCCTGGT CGCCGGACCA Н ш G

TGCGATGAGC TGGGTGCGCC AAGCCCCTGG GGATTTACCT TTAGCAGCTA

BSPEI

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CCTAAATGGA AATCGTCGAT ACGCTACTCG ACCCACGCGG TTCGGGGACC

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Figure 8: sequence and restriction map of the synthetic gene encoding the consensus single-chain fragment VH3-Vk2 (continued) ഗ U C ഗ Ċ ഗ Ø ഗ > 3 回 XhoI U

GGCAGCACCT CCGTCGTGGA GCCATCGCCG CGGTAGCGGC CGCGCTAATC GCGCGATTAG GAGTGGGTGA CTCACCCACT GAAGGGTCTC CTTCCCAGAG

NspV Z PmlI K S HH ĮΉ 又 C ×  $\gt$ വ Ω K  $\succ$ 

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TGATAATTCG ACTATTAAGC CCATTTCACG GGTAAAGTGC GGCCGTTTTA CCGGCAAAAT TAGCGTGAAA ATCGCACTTT TAATACGCCT ATTATGCGGA

EagI AAGATACGGC Н Δ 回 CTGCGTGCGG K K Н TGTATCTGCA AATGAACAGC S Z Σ Ø Ц  $\succ$ П AAAAACACCC H Z NspV

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TTCTATGCCG GACGCACGCC TTACTTGTCG

ACATAGACGT

TTTTTGTGGG

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GCGATGGATT TGCGCGCGTT GGGGCGCGA TGGCTTTTAT CGTGTATTAT

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Figure 8: Sequence and restriction map of the synthetic gene encoding the consensus single-chain fragment VH3-VK2 (continued) GCACATAATA ACGCGCGCAACCTAACTA	S A G G G S BlpI	*****	AGGCACCCTG GTGACGGTTA GCTCAGCGGG TGGCGGTTCT	TCCGTGGGAC CACTGCCAAT CGAGTCGCCC ACCGCCAAGA	S G G G G G G S D I ECORV
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CAACGGCTAT GTTGCCGATA TGCTGCATAG ACGACGTATC AGCCAAAGCC TCGGTTTCGG CTGCAGAAGC GACGTCTTCG CGAGCATTAG GCTCGTAATC

Figure 8: sequence and restr	striction	map o	f the sy	yntheti	ic gene ei	ncoding	the cor	isensus s	ingle-c	hain fr	agmen	t VH3-VK	2 (cont	tinued)	
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GGCAGCAACC

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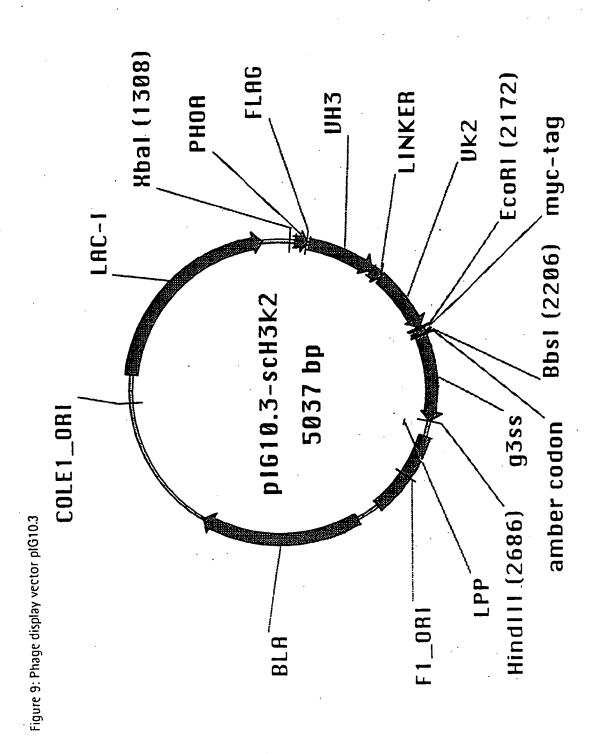
GCAAAATCGC

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GGGCGGCTG CCCGCCGAC CATTATACCA GTAATATGGT TTGCCAGCAG AACGGTCGTC GCGTGTATTA CGCACATAAT GAAGACGTGG CTTCTGCACC

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TTC ACGTACGGAA TGCATGCCTT TTGAAATTAA AACTTTAATT GGTACGAAAG CTTTGGCCAG GAAACCGGTC



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Figure 10: Sequence analysis of initial libraries

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Figure 10: Sequence analysis of initial libraries

Figure 11: Expression analysis of initial library



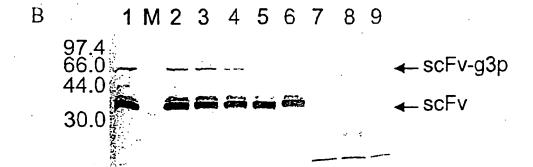


Figure 12: Increase of specificity during the panning rounds

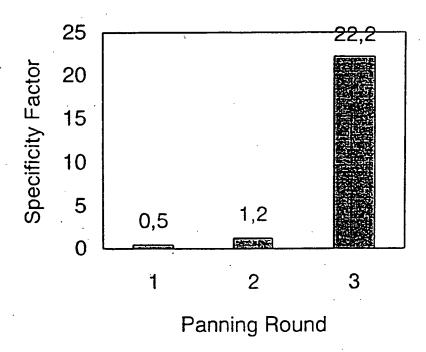
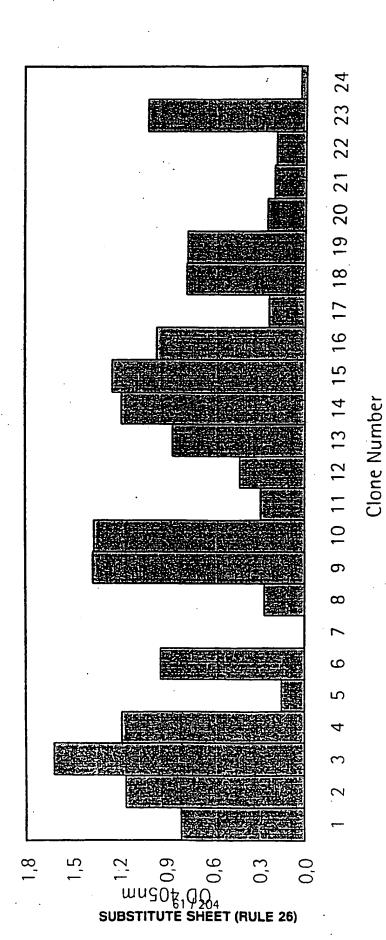
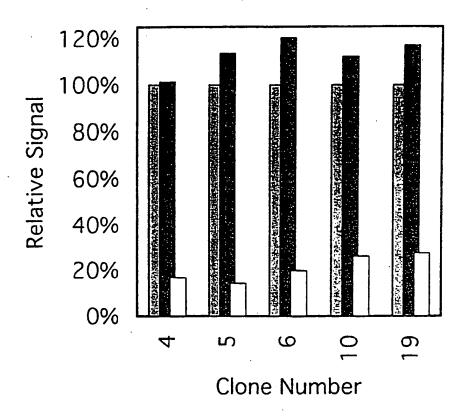


Figure 13: Phage ELISA of clones after the 3rd round of panning



WO 97/08320 PCT/EP96/03647

Figure 14: Competition ELISA



- No Inhibition
- Inhibition with BSA
- ☐ Inhibition with Fluorescein

Figure 15: Sequence analysis of fluorescein binders

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Figure 16: Purification of fluorescein binding scFv fragments

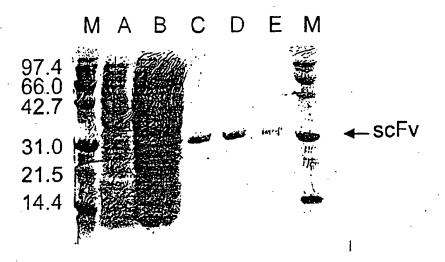
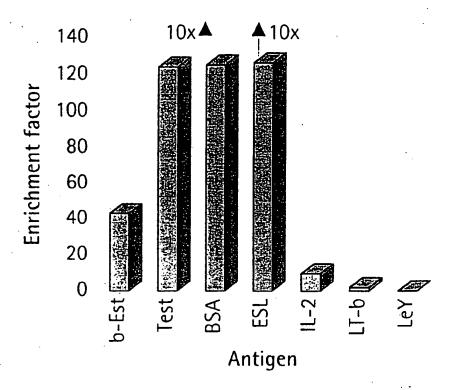


Figure 17: Enrichment factors after three rounds of panning



anti-B-estradiol antibodies D4-6 anti-ESL-1 antibodies 9.0 0.8 0.2 0.4 0 Jan-(mn204)00 SNBSTITUTE SHEET (RULE 26) 66 / 204

Figure 18: ELISA of anti-ESL-1 and anti-β-estradiol antibedies

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Figure 19: Selectivity and cross-reactivity of HuCAL antibodies

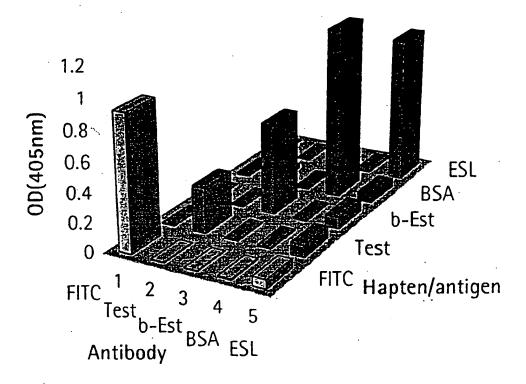


Figure 20: Sequence analysis of estradiol binders

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Figure 22: Sequence analysis of lymphotoxin-B binders

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Figure 23: Sequence analysis of ESL-1 binders

Frequency	4	4	2	<del></del>	, —	. 2	-	13	ش		<b></b>	
103	8	≥	≥	≥	≥	≥	≥	≶	≯	≥	>	≥
105	<u>&gt;</u>	>	>	>	>	>	>	>	>	>	>-	>
101							0					۵
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000 l	1	<u>~</u>	a		O	۵	$\checkmark$	<u>~</u>	œ	ட	ı	
100Ca	i	ı	ı	1	œ	1	ı	ı	ı	1	ı	1
J0 <u>.</u> 01	1	œ	œ	<u>~</u>	œ		œ	œ	≥	œ	ŀ	œ
1008	ı	>	S	_	مـ	_	>	8		$\checkmark$	1	<u>~</u>
A001	1	ш.	¥	V	≥	Σ	≥	<del></del>	工	S	ı	O.
001	ш	S	S	9	S		8	$\checkmark$	>	¥	щ,	<b>×</b>
66	<del></del>		S	>-	V	>	<b>—</b>	S	>-	<b>—</b>	ш	<del></del>
. 86	ட	ш	ш	ш	ب.	3	ш	ш	O	ш	Σ	ш
<b>Z</b> 6	9	C	$\checkmark$	0	ட	ш	S	¥	<b></b>	œ	_	ш
96	щ	ட	_	Q	エ	Z	>-	ட்	$\checkmark$	≥,	>-	ட
<i>9</i> 6	9	O		ш	z	ىب	O	O	$\times$	$\alpha$		O
<b>t</b> 6	$\propto$	œ	œ	α.	~	8	α.	$\propto$	æ	$\alpha$	$\alpha$	<u>~</u>
63	Þ	Ø	A	A	A	A	A	⋖	A	A	A	A
<i>7</i> 6	$\overline{\mathcal{O}}$	ں	ပ	ں	ں	ر ر	ں	U	ں	ں	ں	ပ

Figure 24: Sequence analysis of BSA binders

Frequency	2	<del></del>	<del></del>	<b>-</b>	<del></del>	_
103	3	3	>	3	≥	≥
105	>	>	>	>	>	>
101	Ω			۵		
300 €	Σ	ட	Σ	Σ	Σ	ட
100D	>	œ	œ	O	>-	ட
J001	>	ц.	>	S	≥	エ
1008	0	>-	>	≥	z	<b>—</b>
A001	_	z	ш	S	م	ب.
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66	>	Σ	0	<u>«</u>	≥	¥
86	ட	>	ш	>	œ	ட
۷6	9	<b>—</b>	ய	ш	S	g
96	O	ட	بـــ	¥	م	O
96		>	>	ш	<b>&gt;</b>	۵
<b>7</b> 6	8	$\propto$	$\propto$	$\simeq$	$\propto$	œ
63	4	A	4	×	A	Ø
76	ں	ပ	ں	ں	ں	ں

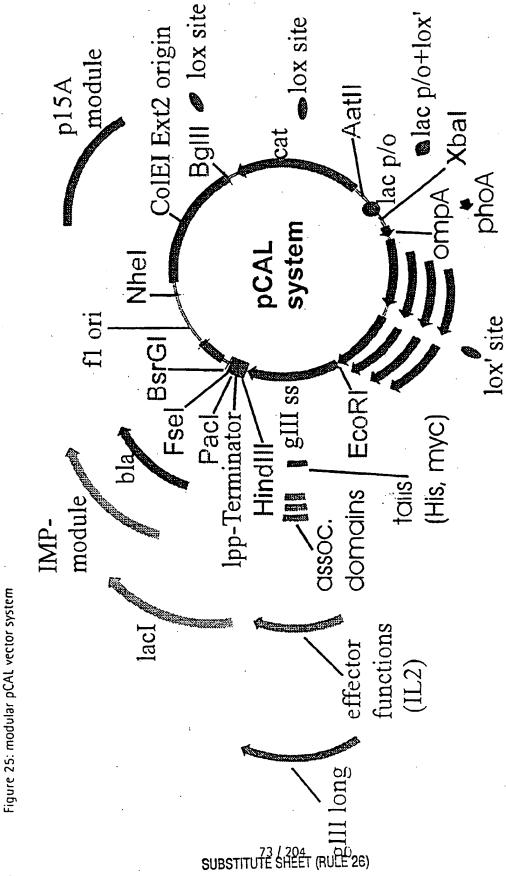


Figure 25a: List of unique restriction sites used in or suitable for HuCAL genes or pCAL vectors

unique restriction site	Isoschizomers
Aatll	/
AfIII	Bfrl, BspTl, Bst98l
Ascl	1
Asel	Vspl, Asnl, PshBl
BamHI	Bstl
Bbel	Ehel, Kasl, Narl
Bbsl	BpuAl, Bpil
BgIII	
Blpl	Bpu11021,Celll, Blpl
BsaBI	Mami, Bsh1365i, BsrBRi
BsiWl	Pfl23II, SpII, Sunl
BspEl	AccIII, BseAI, BsiMI, Kpn2I, Mrol
BsrGl	Bsp1407l, SspBl
BssHII	Paul
BstEll	BstPl, Eco91l, Eco0651
BstXI	
Bsu36l	Aocl, Cvnl, Eco811
Dralll	
DsmAl	
Eagl	BstZI, EclXI, Eco52I, XmaIII
Eco571	
Eco01091	Drall
EcoRI	
EcoRV	Eco32l
Fsel	1
HindIII	1
Hpal	
Kpnl	Acc65l, Asp718l
Mlul	
Mscl	Ball, MluNl

WO 97/08320 PCT/EP96/03647

Figure 25a: List of unique restriction sites used in or suitable for HuCAL genes or pCAL vectors

unique restriction site	Isoschizomers
Munl	Mfel
Nhel	
Nsil	Ppu10l, EcoT22l, Mph1103l
NspV	Bsp119l, BstBl, Csp45l, Lspl, Sful
Pacl	I
Pmel	1
PmII	BbrPl, Eco72I, PmaCl
Psp5II	PpuMI
Pstl	
Rsrll	(Rsril), Cpol, Cspl
SanDI	
Sapi	
SexAl	1
Spel	_ / ·
Sfil	
Sphl	Bbul, Pael, Nspl
Stul	Aatl, Eco147l
Styl	Eco130l, EcoT14l
Xbal	BspLU11II
Xhol	PaeR7I
Xmal	Aval, Smal, Cfr9l, PspAl

Figure 26: list of pCAL vector modules

WO 97/08320	•			PCT/EP96/0364
reference	Skerra et al. (1991) Bio/Technology 9, 273-278	Hoess et al. (1986) Nucleic Acids Res. 2287–2300	see M2	Ge et al., (1994) Expressing antibodies in E. coli. In: Antibody engineering: A practical approach. IRL Press, New York, pp 229-266
template	vector pASK30	(synthetic)	(synthetic)	vector plG10
sites to be inserted	Aatli	lox, BgIII	lox', Sphl	none
sites to be removed	2x Vspl (Asel)	2x Vspl (Asel)	none	Sphl, BamHl
functional element	lac promotor/operan	Cre/lox recombination site	Cre/lox' recombination site	glllp of filamentous phage with N- terminal myctail/amber codon
module/flan- king No restriction sites	AatII-lacp/o- Xbal	BgIII-lox- Aatli	Xbal-lox'- Sphl	EcoRI- gIlllong- HindIII
N <sub>O</sub>	M1	M2	M3	M7-1

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	see M7-1	see M7-1	see M3	see M1	see M1	see M1	see M1
	vector plG10	vector plG10	(synthetic)	(synthetic)	pASK30	pASK30	pASK30
			lox	Pacl, Fsel	Pacl, Fsel, BsrGl	BsrGI, Nhel	BsrGI, Nhel
-	Sphl	Sphl, Bbsl	none	none	Vspl, Eco571, BssSl	Dralll (Banll not removed)	DrallI, BanlI
modules	truncated gillp of filamentous phage with N-termina. Gly- Ser linker	truncated glllp of filamentous phage with N-terminal myctail/amber codon	Cre/lox recombination site	lpp-terminator	beta-lactamase/bla (ampR)	origin of single- stranded replication	origin of single- stranded replication
Figure 26: list of pCAL vector modules	EcoRI-gIIIss- HindIII	M7-III EcoRI-gIIIss- HindIII	Sphl-lox- HindIII	HindIII-Ipp- Pacl	M10- Paci/Fsel-bla- II BsrGi	M11- BsrGl-f1 ori-	BsrGI-f1 ori- Nhel
Figure 2	M7-11	M7-III	M8	M9-11	M10-	M11-	M11-

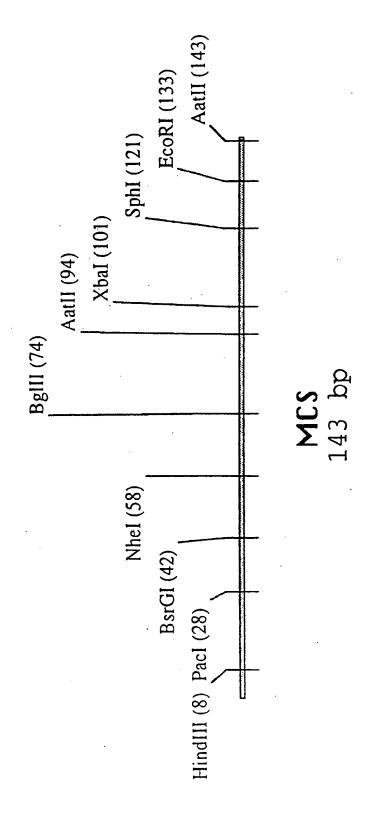
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Figure 26: list of pCAL vector modules

WO 97/0832	20	·			PCT/EP96
Rose, R.E. (1988) Nucleic Acids Res. 16, 355	see M3	Yanisch-Peron, C. (1985) Gene 33,103-119	Cardoso, M. & Schwarz,S. (1992) J. Appl. Bacteriol.72, 289-293	see M1	Knappik, A & Blückthun, A. (1994) BioTechniques 17, 754-761
pACYC184	(synthetic)	pUC19	pACYC184	(synthetic)	(synthetic)
Nhel, BgIII	BgIII, lox, Xmnl	BgIII, Nhel			
BssSI, VspI, NspV	none	Eco571 (BssSl not removed)	BspEI, MscI, Styl/Ncol	(synthetic)	(synthetic)
origin of double- stranded replication	Cre/lox recombination site	origin of double- stranded replication	chloramphenicol- acetyltransferase/ cat (camR)	signal sequence of phosphatase A	signal sequence of phosphatase A + FLAG detection tag
Nhel-p15A- BgIII	BgIII-lox- BgIII	BgIII-ColEI- Nhel	Aatll-cat- BgIII	Xbal-phoA- EcoRI	Xbal-phoA- FLAG-EcoRI
M12	M13	M14- Ext2	M17	M19	M20

			e i
	Lee et al. (1983) Infect. Immunol. 264-268	see M1	Lindner et al., (1992) Methods: a companion to methods in enzymology 4, 41-
	(synthetic)	pASK30	(synthetic)
	(synthetic)	BstXI, MluI,BbsI, BanII, BstEII, HpaI, BbeI, VspI	(synthetic)
modules	heat-stable enterotoxin II signal (synthetic) sequence	lac-repressor	poly-histidine tail
Figure 26: list of pCAL vector modules	Xbal-stll- Sapl	AfIII-laci- Nhel	EcoRI-Histail- HindIII
Figure 2	M21	M41	M42

Figure 27: functional map and sequence of MCS module



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Figure 27: functional map and sequence of MCS module (continued)

		•	
BsrGI	CCCCCCCCC TGTACACCCC GGGGGGGG ACATGTGGGG	Aatii Xbai CCCCCCCGA CGTCCCCCT GGGGGGCT GCAGGGGGAA	Sphi EcoRI Aatli CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
PacI	000	BgllI ~~~~~~ CCAGATCTCC GGTCTAGAGG	55555555555555555555555555555555555555
· I I ]	TTCCCCCCCC	Bglii  GCCCCCCCC CCAGATCTCC  GGGGGGGG GGTCTAGAGG	Sphi ccccccarc c
HindI	ACATGTAAGC TGTACATTCG	NheI CCCCCCGCTA GGGGGGCGAT	Xbal ~~~~~ CTAGACCCCC GATCTGGGGG
	<del></del>	51	01

Figure 28: functional map and sequence of pMCS cloning vector

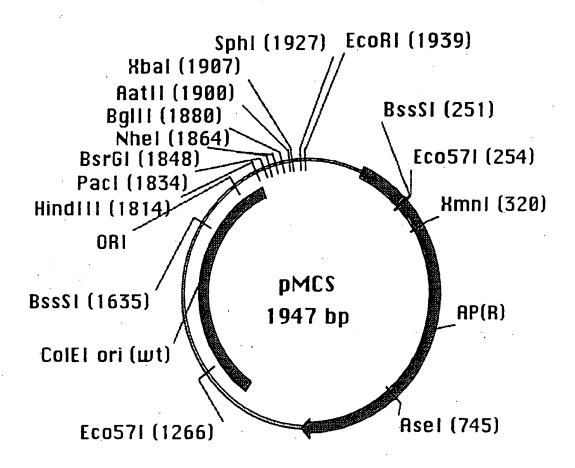


Figure 28: fur	Figure 28: functional map and sequence 1 CAGGTGGCAC GTCCACCGTG	of pMCS cloning vector (continued) TTTTCGGGGA AATG AAAAGCCCCT TTAC	ontinued) AATGTGCGCG TTACACGCGC	GAACCCCTAT CTTGGGGATA ATGAGACAAT	TTGTTTATTT AACAAATAAA AACCCTGATA
101	AAGATTTATG AATGCTTCAA	TAAGTTTATA TAATATTGAA	CATAGGCGAG AAAGGAAGAG	TACTCTGTTA TATGAGTATT	TTGGGACTAT
151	TTACGAGGTT GTGTCGCCCT CACAGCGGGA	TATTCCCTTT ATAAGGGAAA	TTTGCGGCAT	TTTGCCTTCC AAACGGAAGG	TGTTTTGCT ACAAAAACGA
201	CACCCAGAAA GTGGGTCTTT	CGCTGGTGAA GCGACCACTT	AGTAAAAGAT TCATTTTCTA	Eco57I ~~~~~~ GCTGAAGATC CGACTTCTAG	AGTTGGGTGC TCAACCCACG BSSSI
251	ACGAGTGGGT TGCTCACCCA BssSI	TACATCGAAC ATGTAGCTTG	TGGATCTCAA ACCTAGAGTT	CAGCGGTAAG GTCGCCATTC	^ ATCCTTGAGA TAGGAACTCT

Figure 28: functional map and sequence of pMCS cloning vector (continued)

XmnI

301	GTTTTCGCCC CAAAAGCGGG	CGAAGAACGT GCTTCTTGCA	TTTCCAATGA AAAGGTTACT	TGAGCACTTT ACTCGTGAAA	TAAAGTTCTG
351	CTATGTGGCG	CGGTATTATC GCCATAATAG	CCGTATTGAC GGCATAACTG	GCCGGGCAAG	AGCAACTCGG TCGTTGAGCC
401	TCGCCGCATA	CACTATTCTC GTGATAAGAG	AGAATGACTT TCTTACTGAA	GGTTGAGTAC	TCACCAGTCA AGTGGTCAGT
451	CAGAAAAGCA GTCTTTTCGT	TCTTACGGAT AGAATGCCTA	GGCATGACAG CCGTACTGTC	TAAGAGAATT ATTCTCTTAA	ATGCAGTGCT TACGTCACGA
501	GCCATAACCA CGGTATTGGT	TGAGTGATAA ACTCACTATT	CACTGCGGCC	AACTTACTTC TTGAATGAAG	TGACAACGAT ACTGTTGCTA
551	CGGAGGACCG	AAGGAGCTAA TTCCTCGATT	CCGCTTTTTT GGCGAAAAAA	GCACAACATG CGTGTTGTAC	GGGGATCATG CCCCTAGTAC
601	TAACTCGCCT ATTGAGCGGA	TGATCGTTGG ACTAGCAACC	GAACCGGAGC	TGAATGAAGC ACTTACTTCG	CATACCAAAC GTATGGTTTG
651	GACGAGCGTG		ACACCACGAT GCCTGTAGCA ATGGCAACAA COTTTAGCAAA	な な し な な し ご ご し 内	

Figure 28: functional map and sequence of pMCS cloning vector (continued)

	CTGCTCGCAC	TGTGGTGCTA	CGGACATCGT	TACCGTTGTT	GCAACGCGTT	•
					AseI	
701	ACTATTAACT TGATAATTGA	GGCGAACTAC CCGCTTGATG	TTACTCTAGC AATGAGATCG	TTCCCGGCAA	CAATTAATAG	
751	ACTGGATGGA TGACCTACCT	GGCGGATAAA CCGCCTATTT	GTTGCAGGAC CAACGTCCTG	CACTTCTGCG GTGAAGACGC	CTCGGCCCTT GAGCCGGGAA	
801	CCGGCTGGCT	GGTTTATTGC CCAAATAACG	TGATAAATCT ACTATTTAGA	GGAGCCGGTG CCTCGGCCAC	AGCGTGGGTC TCGCACCCAG	
851	TCGCGGTATC AGCGCCATAG	ATTGCAGCAC TAACGTCGTG	TGGGGCCAGA	TGGTAAGCCC	TCCCGTATCG AGGCCATAGC	
901	TAGTTATCTA ATCAATAGAT	CACGACGGGG GTGCTGCCCC	AGTCAGGCAA TCAGTCCGTT	CTATGGATGA GATACCTACT	ACGAAATAGA TGCTTTATCT	
951	CAGATCGCTG GTCTAGCGAC	AGATAGGTGC TCTATCCACG	CTCACTGATT GAGTGACTAA	AAGCATTGGT TTCGTAACCA	AACTGTCAGA TTGACAGTCT	
1001	CCAAGTTTAC GGTTCAAATG	TCATATATAC AGTATATATG	TTTAGATTGA AAATCTAACT	TTTAAAACTT AAATTTTGAA	CATTTTAAT GTAAAAATTA	

Figure 28: functional map and sequence of pMCS cloning vector (continued)

1051	TTAAAAGGAT AATTTTCCTA	CTAGGTGAAG GATCCACTTC	ATCCTTTTTG TAGGAAAAAC	ATAATCTCAT TATTAGAGTA	GACCAAAATC CTGGTTTTAG
1101	CCTTAACGTG GGAATTGCAC	AGTTTTCGTT TCAAAAGCAA	CCACTGAGCG GGTGACTCGC	TCAGACCCCG	TAGAAAAGAT ATCTTTTCTA
1151	CAAAGGATCT GTTTCCTAGA	TCTTGAGATC AGAACTCTAG	CTTTTTTTCT GAAAAAAAGA	GCGCGTAATC CGCGCATTAG	TGCTGCTTGC ACGACGAACG
1201	AAACAAAAAA TTTGTTTTT	ACCACCGCTA TGGTGGCGAT	CCAGCGGTGG	TTTGTTTGCC AAACAAACGG	GGATCAAGAG CCTAGTTCTC
1251	CTACCAACTC GATGGTTGAG	TTTTTCCGAA AAAAAGGCTT	GGTAACTGGC CCATTGACCG EC	C TTCAGCAGAG G AAGTCGTCTC Eco57I	CGCAGATACC GCGTCTATGG
	1		l T	? ? ? ?	
1301	AAATACTGTC TTTATGACAG	CTTCTAGTGT GAAGATCACA	AGCCGTAGTT TCGGCATCAA	AGGCCACCAC TCCGGTGGTG	TTCAAGAACT AAGTTCTTGA
1351	CTGTAGCACC GACATCGTGG	GCCTACATAC	CTCGCTCTGC	TAATCCTGTT ATTAGGACAA	ACCAGTGGCT TGGTCACCGA

TGCTGGCCTT

CCTGGCCTTT

AAACGCCAGC AACGCGGCCT TTTTACGGTT

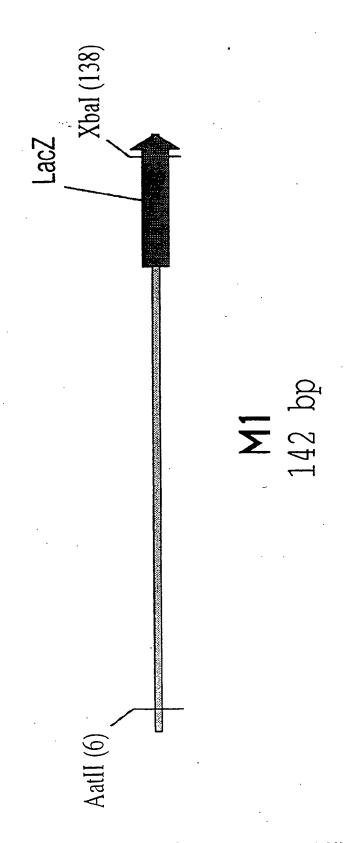
1751

Figure 28: functional map and sequence of pMCS cloning vector (continued)

Figure 28: functional map and sequence of pMCS cloning vector (continued)

ACGACCGGAA	BsrGI	CCCCCCTGTA GGGGGGACAT	AatII	CCCCGACGTC	ORI	TTCACGT
TIGCGCCGGA AAAAIGCCAA GGACCGGAAA ACGACCGGAA	PacI	CCCCCCCTT AATTAACCCC GGGGGGAA TTAATTGGGG	BglII	CCCCCCCAG ATCTCCCCCC GGGGGGGTC TAGAGGGGGG	ECORI	CCCCCCGAA TTCACGT GGGGGGCTT AAGTGCA
AAAATGCCAA		CCCCCCCTT	Bg	CCCCCCCAG	Sphi	CGCATGCCCC GCGTACGGGG
TTGCGCCGGA	HindIII	GTAAGCTTCC CATTCGAAGG	NheI	CCGCTAGCCC	!	ACCCCCCCCC TGGGGGGGGG
TTTGCGGTCG		TTGCTCACAT	BsrGI	CACCCCCCC	XbaI	CCCCCTCTAG GGGGGAGATC
		1801		1851	17° 61 17°	1901

Figure 29: functional map and sequence of pCAL module M1



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CCGAAATGTG GGCTTTACAC AGGCACCCCA TCCGTGGGGT CTCACTCATT GAGTGAGTAA TGTGAGTTAG ACACTCAATC CTGCAGAATT GACGTCTTAA

GATAACAATT CTATTGTTAA TAACACTCGC ATTGTGAGCG GTTGTGTGGA CAACACACCT GCCGAGCATA CGGCTCGTAT AAATACGAAG TTTATGCTTC 51

## XbaI

LO GA CGAATTTCTA GCTTAAAGAT ACCATGATTA TGGTACTAAT AACAGCTATG TTGTCGATAC TCACACAGGA AGTGTGTCCT

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Figure 30: functional map and sequence of pCAL module M7-II

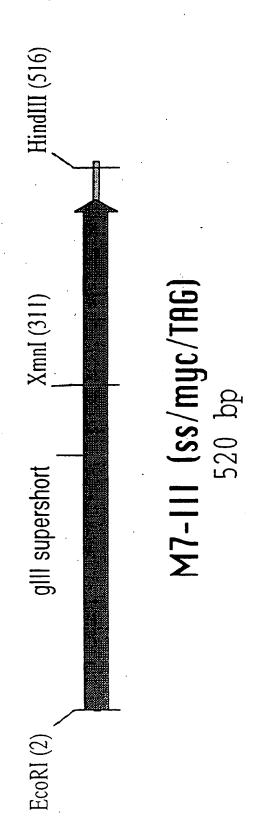


Figure 30: functional map and sequence of pCAL module M7-II (continued)

		GTGGTGGCTC	CACCACCGAG
		CTCTGAGGAG GATCTGTAGG	CTAGACATCC
		CTCTGAGGAG	GAGACTCCTC
		AGAAGCTGAT	TCTTCGACTA
ないのは	\ \ \ \ \ \	GAATTCGAGC	CTTAAGCTCG
		~	

51	TGGTTCCGGT ACCAAGGCCA	GATTTTGATT ATGAAAGAT CTAAAACTAA TACTTTTCTA	ATGAAAAGAT TACTTTTCTA	GATTTTGATT ATGAAAGAT GGCAAACGCT AATAAGGGGG CTAAAAACTAA TACTTTTCTA CCGTTTGCGA TTATTCCCCC	AATAAGGGGG TTATTCCCCC	
101	CTATGACCGA	AAATGCCGAT	GAAAACGCGC	AAATGCCGAT GAAAACGCGC TACAGTCTGA CGCTAAAGGC	CGCTAAAGGC	

SACT GCGATTTCCG	ATGTCAGACT	TTTACGGCTA CTTTTGCGCG	TTTACGGCTA	GATACTGGCT	
AAAIGCCGAI GAAAACGCGC IACAGICIGA CGCIAAAGGC	TACAGI	GAAAACGCGC	AAATGCCGAT	CIAIGACCGA	101

	TCCGGCCTTG CTAATGGTAA TGGTGCTACT GGTGATTTTG	AGGCCGGAAC GATTACCATT ACCACGATGA CCACTAAAAC
	TGGTGCTACT	ACCACGATGA
•	CTAATGGTAA	GATTACCATT
	TCCGGCCTTG	AGGCCGGAAC
	TGGTGACGTT	ACCACTGCAA
	201	

## XmnI

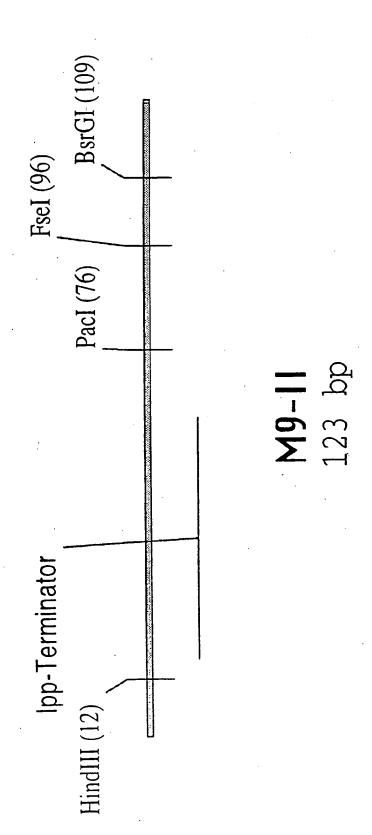
AATCGGTTGA	TTAGCCAACT
ATTTCCGTCA ATATTTACCT TCCCTCCCTC AAT	AAAGGCAGT TATAAATGGA AGGGAGGGAG TTAGCCAACT
ATATTTACCT	TATAAATGGA
IN ATTTCCGTCA A	AT TAAAGGCAGT TATAAAT
TTAATGAATA	AATTACTTAT
301	

Figure 30: functional map and sequence of pCAL module M7-II (continued)

CT TTATGTATGT ATTTTCTACG TTTGCTAACA TACTGCGTAA	ATGACGCATT
TTTGCTAACA	AAACGATTGT
ATTTTCTACG	TAAAAGATGC
TTATGTATGT	GA AATACATACA TAAAAGATGC AAACGATTGT ATGACGCATT
GTTGCCACCT	CAACGGTGGA
4.51	

HindIII	1 1 1 1	TAAGGAGTCT TGATAAGCTT	ACTATTCGAA
		TAAGGAGTCT	ATTCCTCAGA
		501	

Figure 31: functional map and sequence of pCAL module M9-II



(continued)
11-6M
CAL module i
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auc
map
: functional
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Figure 3

## HindIII

AGATTGTGCG	TCTAACACGC
AAAATGGCGC	TTTTACCGCG
TGTGAAGTGA	ACACTTCACT 1
AAGCTTGACC 1	TTCGAACTGG /
9999999999	cccccccccc

GCCGGCCTGG CGGCCGGACC 9999999999 TTAATTAAAG TGTCTGCCGT ACAGACGGCA ACATTTTTT TGTAAAAAA 51

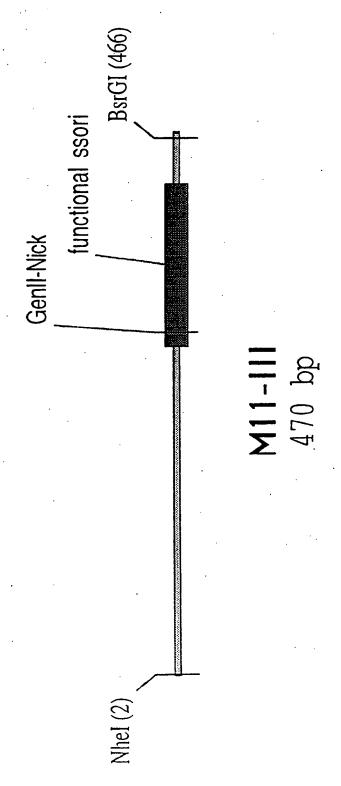
PacI

FseI

## BsrGI

999 ACAGGGGGG TGTCCCCCC GGGGGGGTGT CCCCCCACA 101

Figure 32: functional map and sequence of pCAL module M11-III



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Figure 32: functional map and sequence of pCAL module M11-III (continued)

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Н	GCTAGCACGC	GCCCTGTAGC CGGGACATCG	GGCGCATTAA CCGCGTAATT	ວວວອວວອວອວ	TGTGGTGGTT ACACCACCAA
51	ACGCGCAGCG TGCGCGTCGC	TGACCGCTAC ACTGGCGATG	ACTTGCCAGC TGAACGGTCG	GCCCTAGCGC	CCGCTCCTTT
101	CGCTTTCTTC	CCTTCCTTTC GGAAGGAAAG	TCGCCACGTT AGCGGTGCAA	CGCCGGCTTT GCGGCCGAAA	CCCCGTCAAG GGGGCAGTTC
151	CTCTÀAATCG GAGATTTAGC	GGGCATCCCT CCCGTAGGGA	TTAGGGTTCC AATCCCAAGG	GATTTAGTGC CTAAATCACG	TTTACGGCAC AAATGCCGTG
201	CTCGACCCCA	AAAAACTTGA TTTTT©AACT	TTAGGGTGAT AATCCCACTA	GGTTCTCGTA CCAAGAGCAT	GTGGGCCATC
251	GCCCTGATAG	ACGGTTTTTC TGCCAAAAAG	GCCCTTTGAC	GTTGGAGTCC CAACCTCAGG	ACGTTCTTTA TGCAAGAAAT
301	ATAGTGGACT TATCACCTGA	CTTGTTCCAA GAACAAGGTT	ACTGGAACAA TGACCTTGTT	CACTCAACCC GTGAGTTGGG	TATCTCGGTC ATAGAGCCAG
351	TATTCTTTG	ATTTATAAGG	ATTTATAAGG GATTTTGCCG ATTTCGGCCT		A THUCCHHA A A

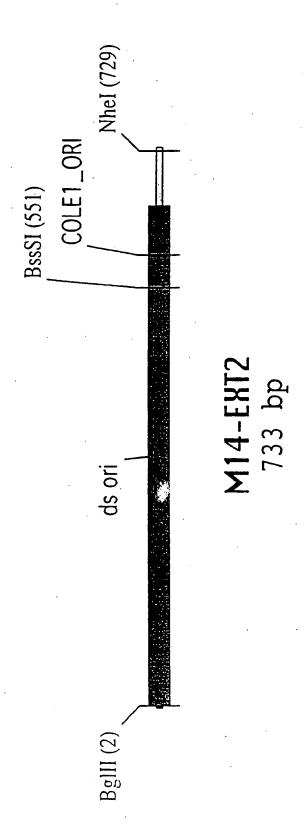
AAAATATTAA TTTATATT GAATTTTAAC CTTAAAATTG AATTTAACGC TTAAATTGCG ATTTAACAAA TAAATTGTTT AAATGAGCTG TTTACTCGAC 401

BsrGI

CGTTTACAAT TTCATGTACA GCAAATGTTA AAGTACATGT

451

Figure 33: functional map and sequence of pCAL module M14-Ext2



CCGGATAAGG CGCAGCGGTC GGGCTGAACG

TGGACTCAAG ACGATAGTTA

351

Figure 33: functional map and sequence of pCAL module M14-Ext2 (continued)

C TGAGCGTCAG	T TTTTCTGCGC	G CGGTGGTTTG	A ACTGGCTACA	C GTAGTTAGGC	G CTCTGCTAAT	T CTTACCGGGT
G ACTCGCAGTC	A AAAAGACGCG	C GCCACCAAAC	T TGACCGATGT	G CATCAATCCG	C GAGACGATTA	A GAATGGCCCA
TTCGTTCCAC	GAGATCCTTT CTCTAGGAAA	CCGCTACCAG	TCCGAAGGTA AGGCTTCCAT	TAGTGTAGCC	ACATACCTCG TGTATGGAGC	TAAGTCGTGT ATTCAGCACA
AACGTGAGTT	GGATCTTCTT	AAAAAAACCA	CAACTCTTTT	ACTGTTCTTC	AGCACCGCCT	CCAGTGGCGA
TTGCACTCAA	CCTAGAAGAA	TTTTTTGGT		TGACAAGAAG	TCGTGGCGGA	GGTCACCGCT
AAAATCCCTT	AAAGATCAAA	GCTTGCAAAC	CAAGAGCTAC	GATACCAAAT	AGAACTCTGT	GTGGCTGCTG
TTTTAGGGAA	TTTCTAGTTT	CGAACGTTTG	GTTCTCGATG	CTATGGTTTA	TCTTGAGACA	
BgllI ~~~~~~ AGATCTGACC TCTAGACTGG	ACCCCGTAGA TGGGGCATCT	GTAATCTGCT CATTAGACGA	TTTGCCGGAT AAACGGCCTA	GCAGAGCGCA CGTCTCGCGT	CACCACTTCA GTGGTGAAGT	CCTGTTACCA GGACAATGGT
-	51	101	151	201	251	301

jure 33: fi	Figure 33: functional map and sequenc ACCTGAGTTC	nce of pCAL module M14-Ext2 (continued) ? TGCTATCAAT GGCCTA	xt2 (continued) GGCCTATTCC	GCGTCGCCAG	CCCGACTTGC
401	GGGGGTTCGT CCCCCAAGCA	GCACACAGCC CGTGTGTCGG	CAGCTTGGAG GTCGAACCTC	CGAACGACCT GCTTGCTGGA	ACACCGAACT TGTGGCTTGA
451	GAGATACCTA CTCTATGGAT	CAGCGTGAGC GTCGCACTCG	TATGAGAAAG ATACTCTTTC	CGCCACGCTT GCGGTGCGAA	CCCGAAGGGA GGGCTTCCCT
501	GAAAGGCGGA CTTTCCGCCT	CAGGTATCCG GTCCATAGGC	GTAAGCGGCA CATTCGCCGT	GGGTCGGAAC CCCAGCCTTG	AGGAGAGCGC TCCTCTCGCG BSSSI
551	ACGAGGGAGC TGCTCCCTCG BssSI	TTCCAGGGGG AAGGTCCCCC	AAACGCCTGG TTTGCGGACC	TATCTTTATA ATAGAAATAT	GTCCTGTCGG CAGGACAGCC
601	GTTTCGCCAC CAAAGCGGTG	CTCTGACTTG GAGACTGAAC	AGCGTCGATT TCGCAGCTAA	TTTGTGATGC AAACACTACG	TCGTCAGGGG AGCAGTCCCC
651	GGCGGAGCCT	ATGGAAAAAC TACCTTTTTG	GCCAGCAACG CGGTCGTTGC	CGGCCTTTTT GCCGGAAAAA	ACGGTTCCTG TGCCAAGGAC

Figure 33: functional map and sequence of pCAL module M14-Ext2 (continued)

NheI

GGCCTTTTGC TCACATGGCT AGC CCGGAAAACG AGTGTACCGA TCG GGCCTTTTGC GCCTTTTGCT CGGAAAACGA 701

Figure 34: functional map and sequence of pCAL module M17

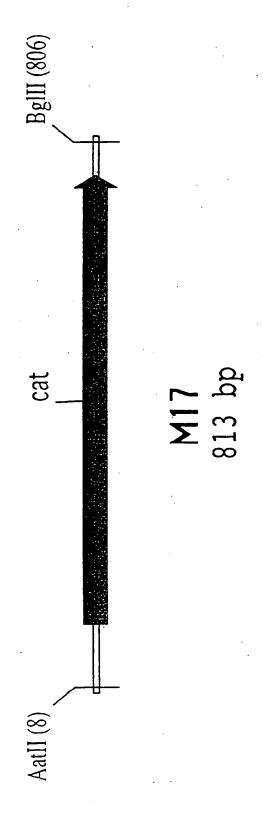


Figure 34: functional map and sequence of pCAL module M17. (continued)

AatII

-	GGGACGTCGG	GTGAGGTTCC	AACTTTCACC TTGAAAGTGG	ATAATGAAAT TATTACTTTA	AAGATCACTA TTCTAGTGAT
51	CCGGGCGTAT	TTTTTGAGTT AAAAACTCAA	ATCGAGATTT TAGCTCTAAA	TCAGGAGCTA AGTCCTCGAT	AGGAAGCTAA TCCTTCGATT
101	AATGGAGAAA	AAAATCACTG	GATATACCAC	CGTTGATATA	TCCCAATGGC
	TTACCTCTTT	TTTTAGTGAC	CTATATGGTG	GCAACTATAT	AGGGTTACCG
151	ATCGTAAAGA	ACATTTTGAG	GCATTTCAGT	CAGTTGCTCA	ATGTACCTAT
	TAGCATTTCT	TGTAAAACTC	CGTAAAGTCA	GTCAACGAGT	TACATGGATA
201	AACCAGACCG TTGGTCTGGC	TTCAGCTGGA AAGTCGACCT	TATTACGGCC	TTTTTAAAGA AAAAATTTCT	CCGTAAAGAA GGCATTTCTT
251	AAATAAGCAC	AAGTTTTATC	CGGCCTTTAT	TCACATTCTT	GCCCGCCTGA
	TTTATTCGTG	TTCAAAATAG	GCCGGAAATA	AGTGTAAGAA	CGGGCGGACT
301	TGAATGCTCA	CCCGGAGTTC	CGTATGGCAA	TGAAAGACGG	TGAGCTGGTG
	ACTTACGAGT	GGGCCTCAAG	GCATACCGTT	ACTTTCTGCC	ACTCGACCAC
351	ATATGGGATA	GTGTTCACCC	TTGTTACACC	GTTTTCCATG	AGCAAACTGA

Figure 34: functional map and sequence of pCAL module M17 (continued)

1.yark 34	TATACCCTAT CACAAGTGG AAC	CACAAGTGGG AACAATGTGG	AACAATGTGG	CAAAAGGTAC	TCGTTTGACT
401	AACGTTTTCA TTGCAAAAGT	TCGCTCTGGA AGCGAGACCT	GTGAATACCA CACTTATGGT	CGACGATTTC GCTGCTAAAG	CGGCAGTTTC GCCGTCAAAG
451	TACACATATA ATGTGTATAT	TTCGCAAGAT AAGCGTTCTA	GTGGCGTGTT CACCGCACAA	ACGGTGAAAA TGCCACTTTT	CCTGGCCTAT GGACCGGATA
501	TTCCCTAAAG AAGGGATTTC	GGTTTATTGA CCAAATAACT	GAATATGTTT CTTATACAAA	TTCGTCTCAG AAGCAGAGTC	CCAATCCCTG GGTTAGGGAC
551	GGTGAGTTTC CCACTCAAAG	ACCAGTTTTG TGGTCAAAAC	ATTTAAACGT TAAATTTGCA	AGCCAATATG TCGGTTATAC	GACAACTTCT CTGTTGAAGA
601	TCGCCCCCGT	TTTCACTATG AAAGTGATAC	GGCAAATATT CCGTTTATAA	ATACGCAAGG TATGCGTTCC	CGACAAGGTG GCTGTTCCAC
651	CTGATGCCGC	TGGCGATTCA	GGTTCATCAT CCAAGTAGTA	GCCGTTTGTG CGGCAAACAC	ATGGCTTCCA TACCGAAGGT
701	TGTCGGCAGA ACAGCCGTCT	ATGCTTAATG TACGAATTAC	AATTACAACA TTAATGTTGT	GTACTGCGAT CATGACGCTA	GAGTGGCAGG
751	GCGGGGCGTA	ATTTTTTAA	GGCAGTTATT	GGGTGCCCTT AAACGCCTTG	AAACGCCTGG

Figure 34; functional map and sequence of pCAL module M17 (continued)

TAAAAAATT CCGTCAATAA CCCACGGGAA TTTGCGGACC CGCCCCGCAT

BglII

801 TGCTAGATCT T

ACGATCTAGA AG

Figure 35: functional map and sequence of modular vector pCAL4

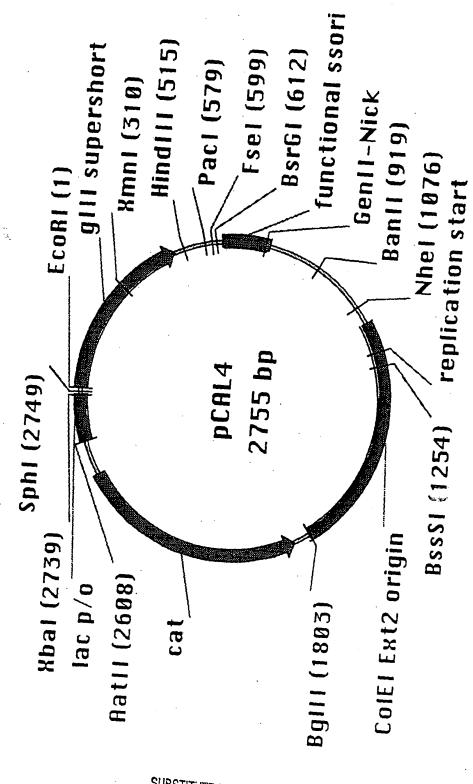


Figure 35: functional map and sequence of modular vector pCAL4 (continued)

ECORI

	TGGCTCT	ACCGAGA
	GGG TGG	CCC ACC
	ATCTGTA	TAGACAT
	TCTGAGGAGG	AGACTCCTCC TAGACATCCC ACCACCGAGA
	GAAGCTGATC TCTGAGGAGG ATCTGTAGGG TGGTGGCTCT	CTTCGACTAG
? ? ?	AATTCGAGCA	TTAAGCTCGT
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C)	SS	CA
TAAGGGG	ATTCCCC	GCTAAAGGCA
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GCAAACGCT	CGTTTGCGA	ACAGTCTGA
TGAAAAGATG	TAAAACTAAT ACTTTTCTAC CGTTTGCGAT TATTCCCCCG	AATGCCGATG AAAACGCGCT ACAGTCTGAC
ATTITICATIA TGAAAGAIG GCAAACGCTA ATAAGGGGGC	TAAAACTAAT	AATGCCGATG
GGTTCCGGTG	CCAAGGCCAC	TATGACCGAA
51		101

101	TATGACCGAA	AATGCCGATG	AAAACGCGCT	ACAGTCTGAC	GCTAAAGGCA
	ATACTGGCTT	TTACGGCTAÇ	TTTTGCGCGA	TGTCAGACTG	CGATTTCCGT
151	AACTTGATTC TTGAACTAAG		TGTCGCTACT GATTACGGTG ACAGCGATGA CTAATGCCAC	CTGCTATCGA GACGATAGCT	TGGTTTCATT ACCAAAGTAA

	GTGATTTTGC	CACTAAAACG
	IT CCGCCCTTGC TAATGGTAAT GGTGCTACTG GTGATTTTGC	AA GGCCGGAACG ATTACCATTA CCACGATGAC CACTAAAACG
•	TAATGGTAAT	ATTACCATTA
	CCGGCCTTGC	GGCCGGAACG
	<b>GGTGACGTTT</b>	CCACTGCAAA
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ATCGGTTGAA CCCTCCCTCA GGGAGGGAGT TATTACCTT ATAAATGGAA TTTCCGTCAA AAAGGCAGTT ATTACTTATT TAATGAATAA 301

Figure 35: functional map and sequence of modular vector pCAL4 (continued)

351	TGTCGCCCTT ACAGCGGGAA	TTGTCTTTGG	CGCTGGTAAA GCGACCATTT	CCATATGAAT GGTATACTTA	TTTCTATTGA AAAGATAACT
401	TTGTGACAAA AACACTGTTT	ATAAACTTAT TATTTGAATA	TCCGTGGTGT AGGCACCACA	CTTTGCGTTT GAAACGCAAA	CTTTTATATG GAAAATATAC
451	TTGCCACCTT AACGGTGGAA	TATGTATGTA	TTTTCTACGT AAAAGATGCA	TTGCTAACAT AACGATTGTA	ACTGCGTAAT TGACGCATTA
501	AAGGAGTCTT TTCCTCAGAA	HindIII ~~~~~~ GATAAGCTTG CTATTCGAAC	ACCTGTGAAG	TGAAAAATGG ACTTTTTACC	CGCAGATTGT GCGTCTAACA
		<b>3.</b> 2	Paci	}	FSeI
551	GCGACATTTT CGCTGTAAAA	TTTTGTCTGC	CGTTTAATTA GCAAATTAAT	AAGGGGGGGG	5500550000
601	TGGGGGGGG	BsrGI ~~~~~ TGTACATGAA	ATTGTAAACG	TTAATATTTT	GTTAAAATTC
	ACCCCCCCCC	ACATGTACTT	TAACATTTGC	AATTATAAAA	CAATTTTAAG

Figure 35: functional map and sequence of modular vector pCAL4 (continued)

651	GCGTTAAATT CGCAATTTAA	TTTGTTAAAT AAACAATTTA	CAGCTCATTT GTCGAGTAAA	TTTAACCAAT AAATTGGTTA	AGGCCGAAAT TCCGGCTTTA	
701	CGGCAAAATC GCCGTTTTAG	CCTTATAAAT GGAATATTTA	CAAAAGAATA GTTTTCTTAT	GACCGAGATA CTGGCTCTAT	GGGTTGAGTG CCCAACTCAC	·
751	TTGTTCCAGT AACAAGGTCA	TTGGAACAAG AACCTTGTTC	AGTCCACTAT TCAGGTGATA	TAAAGAACGT ATTTCTTGCA	GGACTCCAAC CCTGAGGTTG	•
801	GTCAAAGGGC CAGTTTCCCG	GAAAAACCGT CTTTTTGCA	CTATCAGGGC GATAGTCCCG	GATGGCCCAC CTACCGGGTG	TACGAGAACC ATGCTCTTGG	
851	ATCACCCTAA TAGTGGGATT	TCAAGTTTTT AGTTCAAAAA	TGGGGTCGAG ACCCCAGCTC	GTGCCGTAAA CACGGCATTT	GCACTAAATC CGTGATTTAG	
		BanII				
901	GGAACCCTAA CCTTGGGATT	AGGGAGCCCC	CGATTTAGAG GCTAAATCTC	CTTGACGGGG GAACTGCCCC	AAAGCCGGCG TTTCGGCCGC	
951	AACGTGGCGA TTGCACCGCT	GAAAGGAAGG	GAAGAAAGCG	AAAGGAGCGG TTTCCTCGCC	GCGCTAGGGC	

9292992999	AAAGGCCAGC TTTCCGGTCG	TTTCCATAGG	GTCAGAGGTG CAGTCTCCAC	CCTGGAAGCT GGACCTTCGA	ATACCTGTCC TATGGACAGG	CACGCTGTAG GTGCGACATC
AACCACCACA TTGGTGGTGT	CATGTGAGCA GTACACTCGT	TGCTGGCGTT ACGACCGCAA	CGACGCTCAA GCTGCGAGTT	GGCGTTTCCC	CGCTTACCGG	TCTCATAGCT
CGCTGCGCGT	NheI ~~~~~~ GCGTGCTAGC CGCACGATCG	AAGGCCGCGT	TCACAAAAAT AGTGTTTTTA	AAAGATACCA TTTCTATGGT	CCGACCCTGC	CGTGGCGCTT
GTAGCGGTCA CGCTGC	GCTACAGGGC	GAACCGTAAA CTTGGCATTT	CTGACGAGCA GACTGCTCGT	ACAGGACTAT TGTCCTGATA	CTCTCCTGTT GAGAGGACAA	CTTCGGGAAG
Figure 35: functional map and sequence 1001 GCTGGCAAGT GCGACCGTTCA C	TTAATGCGCC AATTACGCGG	AAAAGGCCAG TTTTCCGGTC	CTCCGCCCCC	GCGAAACCCG CGCTTTGGGGC	BSSSI ~~~~~ CCTCGTGCG GGGAGCACGC	GCCTTTCTCC
Figure 35: fu 1001	1051	1101	1151	1201	1251	1301

Figure 35: functional map and sequence of modular vector pCAL4 (continued)

1351	GTATCTCAGT CATAGAGTCA	TCGGTGTAGG AGCCACATCC	TCGTTCGCTC AGCAAGCGAG	CAAGCTGGGC GTTCGACCCG	TGTGTGCACG
1401	AACCCCCCGT TTGGGGGGCA	TCAGCCCGAC AGTCGGGCTG	CGCTGCGCCT GCGACGCGGA	TATCCGGTAA ATAGGCCATT	CTATCGTCTT GATAGCAGAA
1451	GAGTCCAACC	CGGTAAGACA GCCATTCTGT	CGACTTATCG GCTGAATAGC	CCACTGGCAG GGTGACCGTC	CAGCCACTGG GTCGGTGACC
 1501	TAACAGGATT ATTGTCCTAA	AGCAGAGCGA TCGTCTCGCT	GGTATGTAGG CCATACATCC	CGGTGCTACA GCCACGATGT	GAGTTCTTGA
1551	AGTGGTGGCC TCACCACCGG	TAACTACGGC ATTGATGCCG	TACACTAGAA ATGTGATCTT	GAACAGTATT CTTGTCATAA	TGGTATCTGC ACCATAGACG
1601	GCTCTGCTGT CGAGACGACA	AGCCAGTTAC TCGGTCAATG	CTTCGGAAAA GAAGCCTTTT	AGAGTTGGTA TCTCAACCAT	GCTCTTGATC CGAGAACTAG
1651	CGGCAAACAA GCCGTTTGTT	ACCACCGCTG TGGTGGCGAC	GTAGCGGTGG CATCGCCACC	TTTTTTTGTT AAAAAAACAA	TGCAAGCAGC
1701	AGATTACGCG TCTAATGCGC	CAGAAAAAAA GTCTTTTTTT	GGATCTCAAG CCTAGAGTTC	AAGATCCTTT TTCTAGGAAA	GATCTTTTCT CTAGAAAAGA

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CCTAAAACCA	AATTTTTTA	GTAATTCGTA	ACTTAGCGGT	GTATCACTTT	GTTTTGACCA	AGTTATTTGG
TCACGTTAAG	AATAACTGCC	TGTTGTAATT	ATGATGAACC	AATATTTGCC	ACGTTTAAAT	AAACATATTC
AGTGCAATTC	TTATTGACGG	ACAACATTAA	TACTACTTGG	TTATAAACGG	TGCAAATTTA	TTTGTATAAG
GAACGAAAAC	TAAGGGCACC	ATCGCAGTAC	CACAAACGGC	CCTTGCGTAT	CATATTGGCT	CTGAGACGAA
CTTGCTTTTG		TAGCGTCATG	GTGTTTGCCG	GGAACGCATA	GTATAACCGA	GACTCTGCTT
ACGCTCAGTG	ACCAGGCGTT	CCTGCCACTC	TGGAAGCCAT	CACCTTGTCG	AGAAGTTGTC	CAGGGATTGG
TGCGAGTCAC	TGGTCCGCAA	GGACGGTGAG	ACCTTCGGTA	GTGGAACAGC	TCTTCAACAG	
ACGGGGTCTG TGCCCCAGAC	Bglii ~~~~~CAGATCTAGC GTCTAGATCG	TACGCCCCGC	TCTGCCGACA	GCGGCATCAG	ACGGGGGCGA	GAAACTCACC CTTTGAGTGG
1751	1801	1851	1901	1951	2001	2051

GAGTTTTACA

TGACTTTACG

ACTCGTTGAC

TATCCATGTA

GCCAGACCAA

CGGTCTGGTT

2401

ATAGGTACAT

TGAGCAACTG

AGAAATTTTT

AAGAAATGCC

CACGAATAAA

ACTGAAATGC

CTCAAAATGT

TCCAGCTGAA CTTGAGGCCC GATAAAACTT CTATTTGAA AGGTCGACTT GAACTCCGGG CCCACTTGTG AGGTCTCGCT GGGTGAACAC TAGAACGCTT TCCAGAGCGA ATCTTGCGAA ATAAAGGCCG TATTTCGGC CCGGCATTAT GGCCGTAATA ACCATAAGTG CCACATTGTT TTGCCATACG AACGGTATGC GGTGTAACAA TTGTGCGGTG TGGTATTCAC AACACGCCAC CTTTAGCAGC GTACCTTTTG GGCAGAAAGT TTCTTACACT TCTTTAAAAA AAGAATGTGA AAAAGTGGCA GAAATCGTCG CATGGAAAAC CCGTCTTTCA TTTTCACCGT Figure 35: functional map and sequence of modular vector pCAL4 (continued) TATCCGGTCC CTTTGACGGC AGTCAAACGA TTCTTTACGG GTGGTCGAGT AGTCCGCCCG CACCAGCTCA TCAGGCGGGC ATAGGCCAGG GAAACTGCCG TCAGTTTGCT ACTCGTAAGT GAAATCCCTT ACTTTTGCAA ATAGGGTATA TGAGCATTCA GTGCTTATTT CTTTAGGGAA ATATACACAT TATCCCATAT TATATGTGTA TGAAAACGTT 2351 2301 2201 2251 2151 2101

CAGTGATTTT GTCACTAAAA GTGGTATATC CACCATATAG TATATCAACG ATATAGTTGC CGGTAACCCT GCCATTGGGA AGAAATGCTA TCTTTACGAT 2451

TAGCTCCTGA AAATCTCGAT AACTCAAAAAATCTCGAGGACT TTTAGAGCTA TTGAGTTTTT	GGAACCTCAC CCTTGGAGTG
AAATCTCGAT TTTAGAGCTA	GGTGAAAGTT
TAGCTCCTGA	ATTTCATTAT TAAAGTAATA
TTAGCTTCCT	TAGTGATCTT ATCACTAGAA
TTTCTCCATT AAAGAGGTAA	ATACGCCCGG TATGCGGGCC
2501	2551

Figure 35: functional map and sequence of modular vector pCAL4 (continued)

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			2601

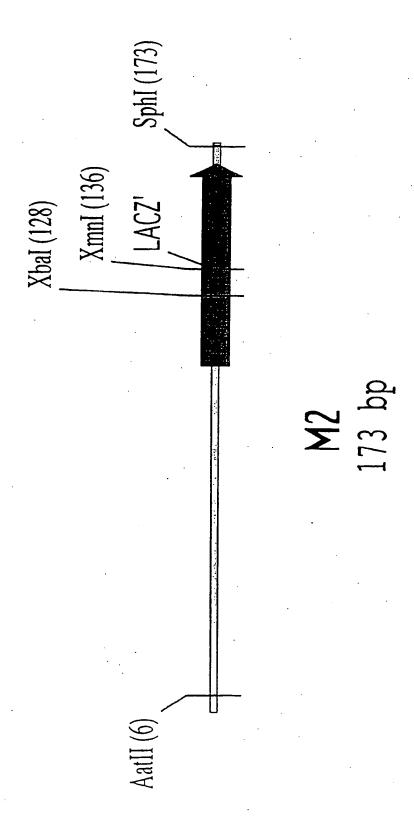
AGGCTTTACA TCCGAAATGT	CCGCCTCGTA TGTTGTGTGG AATTGTGAGC GGATAACAAT
TGTGAGTTA GCTCACTCAT TAGGCACCCC AGGCTTTACA	CGGCTCGTA TGTTGTGTGG AATTGTGAGC GGATAACAAT
GCTCACTCAT CGAGTGAGTA	TGTTGTGTGG ACAACACACC
ATGTGAGTTA TACACTCAAT	CCGGCTCGTA GGCCGAGCAT
CCGACGTCTA GGCTGCAGAT	CTTTATGCTT GAAATACGAA
2601	2651

~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~	3 AAACAGCTAT GACCATGATT ACGAATTTCT AGAGCATGC	C TTTGTCGATA CTGGTACTAA TGCTTAAAGA TCTCGTACGC
? ?	ACGAATTTCT	TGCTTAAAGA
	GACCATGATT	CTGGTACTAA
	AAACAGCTAT	TTTGTCGATA
	TTCACACAGG	AAGTGTGTCC
	2701	

SphI

XbaI

TTTGTCGATA CTGGTACTAA TGCTTAAAGA 22222 ECORI 2751



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.. 7 .. AatII

GGCTTTACAC CCGAAATGTG AGGCACCCCA TCCGTGGGGT CTCACTCATT GAGTGAGTAA TGTGAGTTAG ACACTCAATC GACGTCTTAA CTGCAGAATT

GATAACAATT CTATTGTTAA ATTGTGAGCG TAACACTCGC GTTGTGTGGA CAACACACCT CGGCTCGTAT GCCGAGCATA AAATACGAAG TTTATGCTTC 51

XmnI

XbaI

CATATTACAT GTATAATGTA GAATAACTTC CTTATTGAAG ACCATGTCTA TGGTACAGAT AACAGCTATG TTGTCGATAC TCACACAGGA AGTGTGTCCT

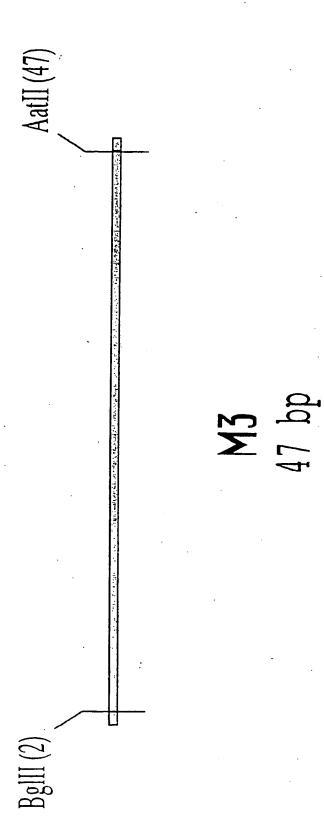
SphI

CGCTATACGA AGTTATCGCA TGC GCGATATGCT TCAATAGCGT ACG

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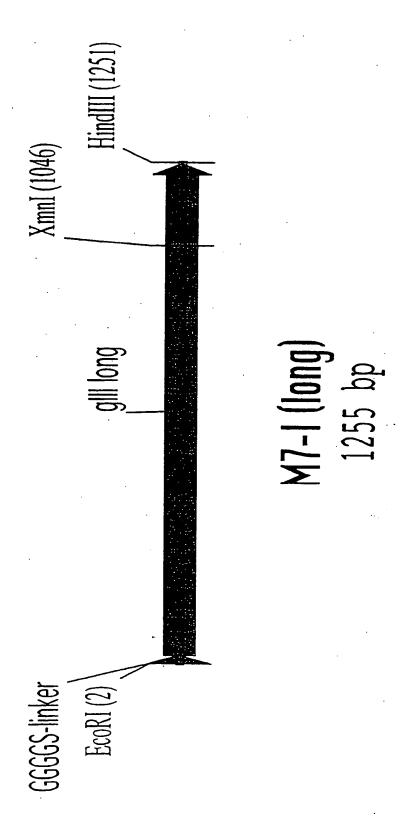


Aatii

Figure 35a: Functional maps and sequences of additional pCAL vector modules and pCAL vectors (continued)

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TGACGTC ACTGCAG TACGAAGTTA ATGCTTCAAT ATGTATGCTA TACATACGAT ACTTCGTATA TGAAGCATAT AGATCTCATA TCTAGAGTAT



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Figure 35a: Functional maps and sequences of additional pCAL vector modules and pCAL vectors (continued)

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ECORI

H	GAATTCGGTG CTTAAGCCAC	GTGGTGGATC CACCACCTAG	TGCGTGCGCT	GAAACGGTTG CTTTGCCAAC	AAAGTTGTTT TTTCAACAAA
51	AGCAAAATCC TCGTTTTÄGG	CATACAGAAA GTATGTCTTT	ATTCATTTAC TAAGTAAATG	TAACGTCTGG ATTGCAGACC	AAAGACGACA TTTCTGCTGT
101	AAACTTTAGA TTTGAAATCT	TCGTTACGCT AGCAATGCGA	AACTATGAGG TTGATACTCC	GCTGTCTGTG CGACAGACAC	GAATGCTACA CTTACGATGT
151	GGCGTTGTAG	TTTGTACTGG	TGACGAAACT ACTGCTTTGA	CAGTGTTACG GTCACAATGC	GTACATGGGT CATGTACCCA
201	TCCTATTGGG AGGATAACCC	CTTGCTATCC GAACGATAGG	CTGAAAATGA GACTTTTACT	GGGTGGTGGC CCCACCACCG	TCTGAGGGTG AGACTCCCAC
251	GCGGTTCTGA CGCCAAGACT	GGGTGGCGGT	TCTGAGGGTG AGACTCCCAC	GCGGTACTAA CGCCATGATT	ACCTCCTGAG TGGAGGACTC
301	TACGGTGATA ATGCCACTAT	CACCTATTCC GTGGATAAGG	GGGCTATACT CCCGATATGA	TATATCAACC ATATAGTTGG	CTCTCGACGG

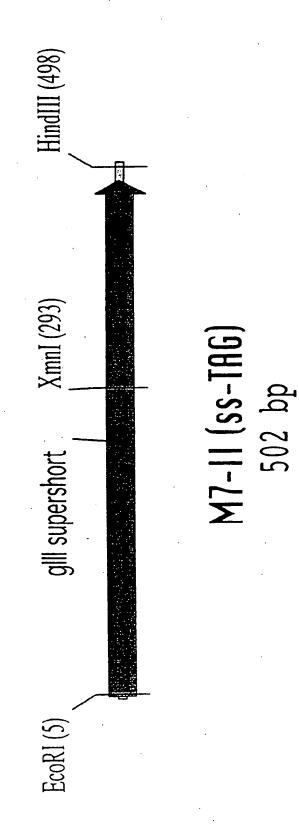
Figure 35a: Functional maps and sequences of additional pCAL vector modules and pCAL vectors (continued)

AACTGTTTAT ACGGGCACTG TTACTCAAGG TTGACAAATA TGCCCGTGAC AATGAGTTCC ATTACCAGTA CACTCCTGTA TCATCAAAAG TAATGGTCAT GTGAGGACAT AGTAGTTTTC TTGCCATTTA AGTCTCTGAC GCGAAAGGTA ATTTGTTTGT GAATATCAAG GCCAATCGTC TAAACAAACA CTTATAGTTC CGGTTAGCAG TCAATGCTGG CGGCGGCTCT GGTGGTGGTT AGTTACGACC GCGCGGCTCT GGTGGTGGTT	CARD ELAN FLAN ENEX	·	
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Figure 35a: Functional maps and sequences of additional pCAL vector modules and pCAL vectors (continued)

	751	GGCGGCTCTG	AGGGAGGCGG TCCCTCCGCC	TTCCGGTGGT AAGGCCACCA	GGCTCTGGTT CCGAGACCAA	CCGGTGATTT GGCCACTAAA
	801	TGATTATGAA ACTAATACTT	AAGATGGCAA TTCTACCGTT	ACGCTAATAA TGCGATTATT	GGGGGCTATG CCCCCGATAC	ACCGAAAATG TGGCTTTTAC
	851	CCGATGAAAA GGCTACTTTT	CGCGCTSCAG	TCTGACGCTA AGACTGCGAT	AAGGCAAACT TTCCGTTTGA	TGATTCTGTC ACTAAGACAG
011007171	901	GCTACTGATT CGATGACTAA	ACGGTGCTGC TGCCACGACG	TATCGATGGT ATAGCTACCA	TTCATTGGTG AAGTAACCAC	ACGTTTCCGG TGCAAAGGCC
	951	CCTTGCTAAT GGAACGATTA	GGTAATGGTG	CTACTGGTGA GATGACCACT	TTTTGCTGGC AAAACGACCG	TCTAATTCCC AGATTAAGGG
	1001	AAATGGCTCA TTTACCGAGT	AGTCGGTGAA TCAGCCACTT	GGTGATAATT CCACTATTAA	CACCTTTAAT	XmnI ~~~~~~~~ GAATAATTTC
	1051	CGTCAATATT GCAGTTATAA	TACCTTCCAT	CCCTCAATCG	GTTGAATGTC CAACTTACAG	GCCCTTTTGT CGGGAAAACA

GACAAAATAA CTGTTTTATT	CACCTTTATG GTGGAAATAC	HindIII	AGTCTTGATA TCAGAACTAT	
ules and pCAL vectors (continued) ATGAATTTTC TATTGATTGT TACTTAAAAG ATAACTAACA	TATATGTTGC ATATACAACG		CGTAATAAGG GCATTATTCC	
dditional pCAL vector modules and pCAL vectors (continued) GGTAAACCCT ATGAATTTTC TATTGATTGT CCATTTGGGA TACTTAAAAG ATAACTAACA	GCGTTTCTTT CGCAAAGAAA		TAACATACTG	
dditional pCAL vector mod GGTAAACCCT CCATTTGGGA	TGGTGTCTTT		CTACGTTTGC GATGCAAACG	
Figure 35a: Functional maps and sequences of ac 1101 CTTTGGCGCT GAAACCGCGA	ACTTATTCCG TGAATAAGGC		TATGTATTTT ATACATAAAA	HindI ~~~~ AGCTT TCGAA
Figure 35a: Functiona 1101	1151		1201	15 27 27 3STITUTE SHEET (RULE 26) 124 / 204



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Figure 35a: Functional maps and sequences of additional pCAL vector modules and pCAL vectors (continued)

## M 7-II (SS-TAG):

		TCTGGTTCC
		CGGTGGTGGC
		GAGGCGGTTC
ECORI	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	CGGGAATTCG
		-

GTGATTTTGA CACTAAAACT	GAAAATGCCG
CGGTGGTGGC TCTGGTTCCG GTGATTTTGA GCCACCACCG AGACCAAGGC CACTAAAACT	GGCTATGACC GAAAATGCCG
CGGTGGTGGC	TGGCAAACG CTAATAAGGG
GAGGCGGTTC	ATGGCAAACG
CGGGAATTCG GCCCTTAAGC	TTATGAAAAG
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ATGGCAAACG CTAATAAGGG GGCTATGACC GAAAATGCCG	CTTTTACGGC
GGCTATGACC	CATTATTCCC CCGATACTGG
CTAATAAGGG	GATTATTCCC
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TTATGAAAAG	AATACTTŤTC
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)	TTCTGTCGCT	AAGACAGCGA
	GCTACAGTCT GACGCTAAAG GCAAACTTGA TTCTGTCGCT	CGATGICAGA CIGCGATIIC CGITIGAACI AAGACAGCGA
	GACGCTAAAG	CTGCGATTTC
	GCTACAGTCT	CGATGTCAGA
) ; ; ;	ATGAAAACGC	TACTTTTGCG
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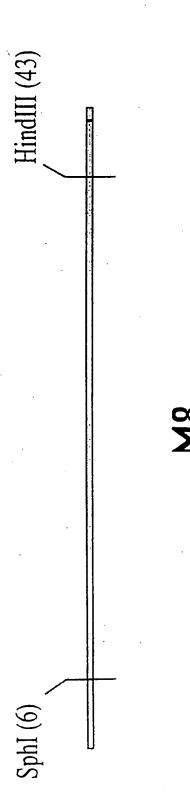
TITCCGGCCT	TAACCACTGC AAAGGCCGGA	
ATTGGTGACG	TAACCACTGC	-
CGATGGTTTC	GCTACCAAAG	
GTGCTGCTAT CGATGGTTTC	CACGACGATA	
ACTGATTACG	TGACTAATGC	
151		

AATTCCCAAA	TTAAGGGTTT
TGCTGGCTCT	ACGACCGAGA
CTGGTGATTT	GACCACTAAA
AATGGTGCTA	TTACCACGAT
TGCTAATGGT	ACGATTACCA
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	CGGTGACGGT GATAATTCAC CTTTAATGAA TAATTTCCGT	A GCCACTGCCA CTATTAAGTG GAAATTACTT ATTAAAGGCA
· · · · · · · · · · · · · · · · · · ·	CTTTAATGAA	GAAATTACTT
	GATAATTCAC	CTATTAAGTG
	CGGTGACGGT	GCCACTGCCA
	TGGCTCAAGT	ACCGAGTTCA
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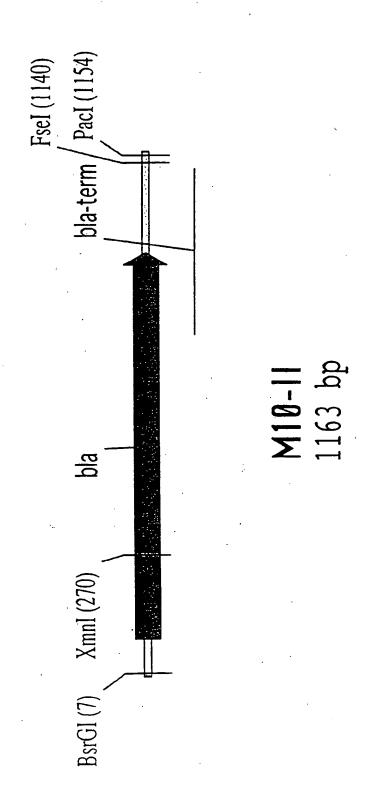
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	: Functional maps	
	Figure 35a	1

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HindIII CTTGATAAGC GAACTATTCG	AATAAGGAGT TTATTCCTCA	CATACTGCGT GTATGACGCA	CGTTTGCTAA GCAAACGATT	GTATTTTCTA CATAAAAGAT	451
CTTTATGTAT GAAATACATA	ATGTTGCCAC TACAACGGTG	TTTCTTTTAT AAAGAAAATA	TGTCTTTGCG	TATTCCGTGG	401
AAAATAAACT TTTTATTTGA	TGATTGTGAC AAAATAAACT ACTAACACTG TTTTATTTGA	AATTTTCTAT TTAAAAGATA	AAACCATATG TTTGGTATAC	TGGCGCTGGT	351
CTTTTGTCTT GAAAACAGAA	GAATGTCGCC CTTACAGCGG	TCAATCGGTT AGTTAGCCAA	CTTCCCTCCC GAAGGGAGGG	CAATATTTAC GTTATAAATG	301



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TAAGCTT HindIII ATTCGAA TACGAAGTTA ATGCTTCAAT ATGTACGCTA ACTTCGTATA TGAAGCATAT CGTACGGTAT GCATGCCATA SphI



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Figure 35a: Functional maps and sequences of additional pCAL vector modules and pCAL vectors (continued)

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C ATGAGACAAT AACCCTGATA	TIGGGACTAT
ATGAGACAAT	TACTCTGTTA
GTATCCGCTC	CATAGGCGAG
ATTCAAATAT	TAAGTTTATA CATAGGCGAG
GGTGTAC	CCCCCACATG
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CAACATTTCC	GTTGTAAAGG
TATGAGTATT	ATACTCATAA
TAATATTGAA AAAGGAAGAG	ATTATAACTT TTTCCTTCTC
TAATATTGAA	ATTATAACTT
CAA	TTACGAAGTT
. 51	

IT TITGCGGCAT TITGCCTICC TGTTTTGCT	ATAAGGGAAA AAACGCCGTA AAACGGAAGG ACAAAAACGA
TTTGCCTTCC	AAACGGAAGG
TTTGCGGCAT	AAACGCCGTA
TATTCCCTTT	ATAAGGGAAA
rcgcccr	CACAGCGGA
101	

T GCTGAGGATC AGTTGGGTGC	A CGACTCCTAG TCAACCCACG
AGTAAAAGAT	TCATTTTCTA
CGCTGGTGAA	GCGACCACTT
CCAGAAA	GTGGGTCTTT
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# ATCCTTGAGA TAGGAACTCT GCGAGTGGGT TACATCGAAC TGGATCTCAA CAGCGGTAAG CGCTCACCCA ATGTAGCTTG ACCTAGAGTT GTCGCCATTC 201

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	ATTTCAAGAC
ACGT TTTCCAATGA TGAGCACTTT	AAAGGTTACT ACTCGTGAAA
TTTCCAATGA	AAAGGTTACT
CGAAGAACGT	GCTTCTTGCA
GTTTTCGCCC	CAAAAGCGGG
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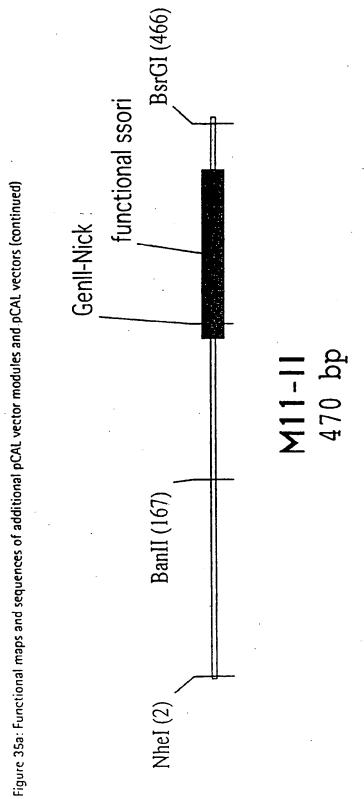
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Figure 35a: Functional maps and sequences of additional pCAL vector modules and pCAL vectors (continued)

	701	ACTGGATGGA TGACCTACCT	GGCGGATAAA CCGCCTATTT	GTTGCAGGAC CAACGTCCTG	CACTTCTGCG GTGAAGACGC	CTCGGCCCTT	
	751	CCGGCTGGCT	GGTTTATTGC	TGATAAATCT ACTATTTAGA	GGAGCCGGTG CCTCGGCCAC	AGCGTGGGTC TCGCACCCAG	
	801	TCGCGGTATC AGCGCCATAG	ATTGCAGCAC TAACGTCGTG	TGGGGCCAGA	TGGTAAGCCC	TCCCGTATCG AGGGCATAGC	
CURG	851	TAGTTATCTA ATCAATAGAT	CACGACGGGG GTGCTGCCCC	AGTCAGGCAA TCAGTCCGTT	CTATGGATGA GATACCTACT	ACGAAATAGA TGCTTTATCT	
	901	CAGATCGCTG GTCTAGCGAC	AGATAGGTGC TCTATCCACG	CTCACTGATT GAGTGACTAA	AAGCATTGGG TTCGTAACCC	TAACTGTCAG ATTGACAGTC	
	951	ACCAAGTTTA TGGTTCAAAT	CTCATATATA GAGTATATAT	CTTTAGATTG GAAATCTAAC	ATTTAAAACT TAAATTTTGA	TCATTTTTAA AGTAAAAATT	
	1001	TTTAAAAGGA AAATTTTCCT	TCTAGGTGAA AGATCCACTT	GATCCTTTTT CTAGGAAAAA	GATAATCTCA CTATTAGAGT	TGACCAAAAT ACTGGTTTTA	
1-1	1051	CCCTTAACGT GGGAATTGCA	GAGTTTTCGT	TCCACTGAGC AGGTGACTCG	GTCAGACCCC CAGTCTGGGG	GTAGAAAAGA CATCTTTTCT	

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1101	TCAAAGGATC	TTCTTGAGAT	CCTTTTTGAT	AATGGCCGGC	CCCCCCCTT
	AGTTTCCTAG	AAGAACTCTA	GGAAAAACTA	TTACCGGCCG	GGGGGGGAA
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	TTAATTCCCC	222			



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Figure 35a: Functional maps and sequences of additional pCAL vector modules and pCAL vectors (continued)

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Н	GCTAGCACGC CGATCGTGCG	GCCCTGTAGC CGGGACATCG	GGCGCATTAA CCGCGTAATT	ວວວອວວອວອວ ອອອວອອວອວອວອ	TGTGGTGGTT ACACCACCAA
51	ACGCGCAGCG TGCGCGTCGC	TGACCGCTAC ACTGGCGATG	ACTTGCCAGC TGAACGGTCG	GCCCTAGCGC CGGGATCGCG	CCGCTCCTTT GGCGAGGAAA
101	CGCTTTCTTC GCGAAAGAAG	CCTTCCTTTC GGAAGGAAAG	TCGCCACGTT AGCGGTGCAA	CGCCGGCTTT	CCCCGTCAAG
151	CTCTAAATCG GAGATTTAGC	Banii ~~~~~ GGGGCTCCCT CCCCGAGGGA	TTAGGGTTCC AATCCCAAGG	GATTTAGTGC CTAAATCACG	TTTACGGCAC
201	CTCGACCCCA	AAAAACTTGA TTTTTGAACT	TTAGGGTGAT AATCCCACTA	GGTTCTCGTA CCAAGAGCAT	GTGGCCATC
251	GCCCTGATAG	ACGGTTTTTC TGCCAAAAAG	GCCCTTTGAC CGGGAAACTG	GTTGGAGTCC ACGTTCTTTA	ACGTTCTTTA TGCAAGAAAT

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Figure 35a:	

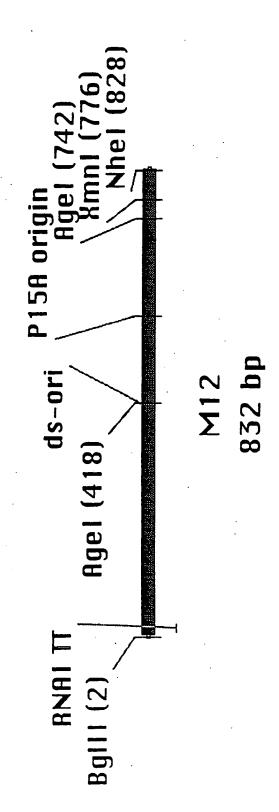
301	ATAGTGGACT	CTTGTTCCAA	ACTGGAACAA	CTTGTTCCAA ACTGGAACAA CACTCAACCC TATCTCGGTC	TATCTCGGTC
	TATCACCTGA	GAACAAGGTT	TGACCTTGTT	GAACAAGGTT TGACCTTGTT GTGAGTTGGG ATAGAGCCAG	ATAGAGCCAG
351	TATTCTTTTG ATAAGAAAAC	ATTTATAAGG TAAATATTCC	GATTTTGCCG CTAAAACGGC		ATTGGTTAAA TAACCAATTT

AAAATATTAA TTTATATT GAATTTTAAC CTTAAAATTG AATTTAACGC TTAAATTGCG ATTTAACAAA TAAATTGTTT AAATGAGCTG TTTACTCGAC 401

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CGTTTACAAT TTCATGTACA GCAAATGTTA AAGTACATGT

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Figure 35a: Functional maps and sequences of additional pCAL vector modules and pCAL vectors (continued)	III	 TCTAATA AGATGATCTT CTTGAGATCG TTTTGGTCTG CGCGTAATCT AGATTAT TCTACTAGAA GAACTCTAGC AAAACCAGAC GCGCATTAGA	GCTCTGA AAACGAAAAA ACCGCCTTGC AGGGCGGTTT TTCGTAGGTT CGAGACT TTTGCTTTTT TGGCGGAACG TCCCGCCAAA AAGCATCCAA	TGAGCTA CCAACTCTTT GAACCGAGGT AACTGGCTTG GAGGAGCGCA ACTCGAT GGTTGAGAAA CTTGGCTCCA TTGACCGAAC CTCCTCGCGT	ACTAAAA CTTGTCCTTT CAGTTTAGCC TTAACCGGCG CATGACTTCA	CTAACTC CTCTAAATCA ATTACCAGTG GCTGCTGCCA GTGGTGCTTT GATTGAG GAGATTTAGT TAATGGTCAC CGACGACGGT CACCACGAAA	ATGTCTT TCCGGGTTGG ACTCAAGACG ATAGTTACCG GATAAGGCGC	GGTCGGA CTGAACGGGG GGTTCGTGCA TACAGTCCAG CTTGGAGCGA
nctional maps and sequences o	2: Bglii	AGATCTAATA AC TCTAGATTAT T	CTTGCTCTGA A GAACGAGACT T	CTCTGAGCTA COGACTCGAT G	GTCACTAAAA C' CAGTGATTTT G	AGACTAACTC C' TCTGATTGAG G	TGCATGTCTT TA	AGCGGTCGGA C TCGCCAGCCT G
Figure 35a: Fun	M 12	Н	51	101	UTE SHEET	201 (30 alum)	251	301

TCCTCTCGCG GTCCTGTCGG TTTGCGCCGG AGGAGAGCGC CAGGACAGCC AAACGCGGCC TCCGTCCTTG TATCTTTATA GGAATGAGAC CCTTACTCTG AGGCAGGAAC ATAGAAATAT Figure 35a: Functional maps and sequences of additional pCAL vector modules and pCAL vectors (continued) ACAGTCCGCA GTAAACCGAA CATTTGGCTT TGTCAGGCGT AAACGCCTGG TTTGCGGACC AgeI GCCTTGACTC TTACTGTGGC CGGAACTGAG AATGACACCG CGCCAGGGGG GCGGTCCCCC TGACGGATGG TCCTCCCTCG AGGAGGGAGC TATTGTCGCC ACTGCCTACC ATAACAGCGG 351 451 401

601	TAAGTATCTT ATTCATAGAA	CCTGGCATCT GGACCGTAGA	CCTGGCATCT TCCAGGAAAT CTCCGCCCCG TTCGTAAGCC GGACCGTAGA AGGTCCTTTA GAGGCGGGGC AAGCATTCGG	CTCCGCCCCG	TTCGTAAGCC AAGCATTCGG
651	ATTTCCGCTC	GCCGCAGTCG	AACGACCGAG	CGTAGCGAGT	GCCGCAGTCG AACGACCGAG CGTAGCGAGT CAGTGAGCGA
	TAAAGGCGAG	CGGCGTCAGC	TTGCTGGCTC	GCATCGCTCA	CGGCGTCAGC TTGCTGGCTC GCATCGCTCA GTCACTCGCT

TTGTCAGGGG

AACAGTCCCC

AAGCACTACG

TCGCAGTCTA

AGCGTCAGAT

CACTGATTTG

GTTTCGCCAC

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ACTTCCCTGT

CGCCCTCTC

GGCTTTGCCG

GGCGGAGCCT ATGGAAAAAC

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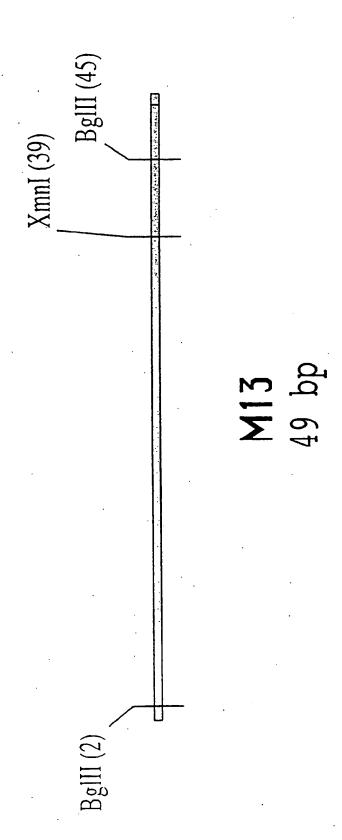
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CCGCCTCGGA

TGAAGGGACA

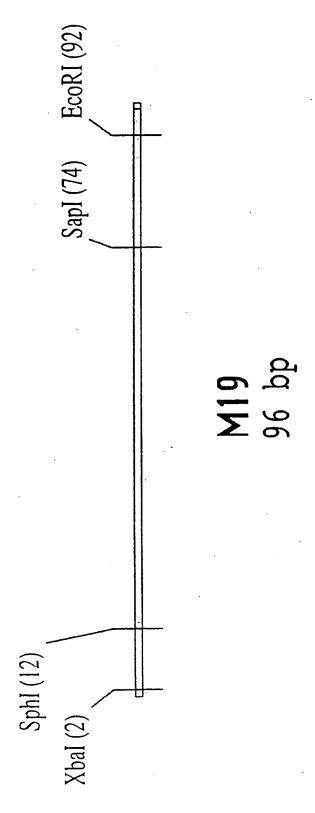
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	TCATC	·
CTGCTGACGC	ACTGACACCC TCATCAGTGC TGACTGTGGG AGTAGTCACG	 20 00 00
TATATCCTGT ATCACATATT CTGCTGACGC ATATAGGACA TAGTGTATAA GACGACTGCG	XmnI CCTGCCACAT GAAGCACTTC GGACGGTGTA CTTCGTGAAG	Nhel AGCCAGTATA CACTCCGCTA GC TCGGTCATAT GTGAGGCGAT CG
TATATCCTGT ATATAGGACA	CCTGCCACAT	AGCCAGTATA TCGGTCATAT
GGAAGCGGAA CCTTCGCCTT	CCTTTTTTCT GGAAAAAAGA	CAACATAGTA GTTGTATCAT
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BglII TTCAGATCT AAGTCTAGA XmnI ATGCTTCAAT TACGAAGTTA ATGTATGCTA TACATACGAT ACTTCGTATA TGAAGCATAT AGATCTCATA TCTAGAGTAT BglII 11111



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Figure 35a: Functional maps and sequences of additional pCAL vector modules and pCAL vectors (continued)

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GATAACGTGA CTATTGCACT AAACAAAGCA TTTGTTTCGT AAATAAATG TTTATTTAC GCGTAGGAGA CGCATCCTCT TCTAGAGCAT AGATCTCGTA

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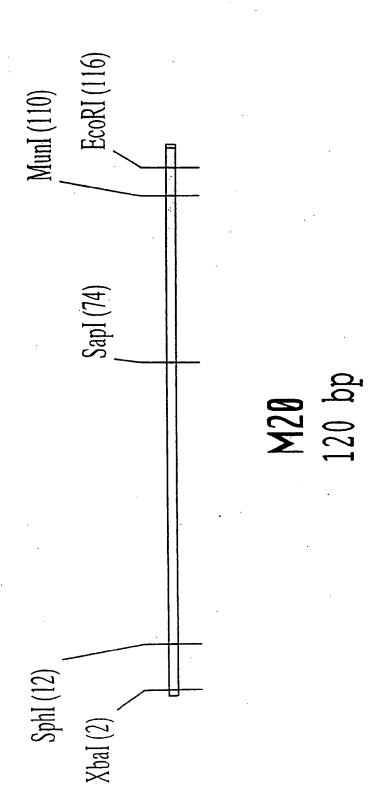
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GAATTC CTTAAG ATGGTTTCGG TACCAAAGCC AGTGGGGACA TCACCCCTGT CCGTTGCTCT GGCAACGAGA GGCACTCTTA CCGTGAGAAT

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M 20:

XbaI SphI

CTATTGCACT GATAACGTGA AAACAAAGCA TTTGTTTCGT AAATAAAATG TTTATTTAC GCGTAGGAGA CGCATCCTCT TCTAGAGCAT AGATCTCGTA

SapI

GACTACAAAG CTGATGTTTC TACCAAAGCC ATGGTTTCGG TCACCCCTGT AGTGGGGACA CCGTTGCTCT GGCAACGAGA CCGTGAGAAT GGCACTCTTA

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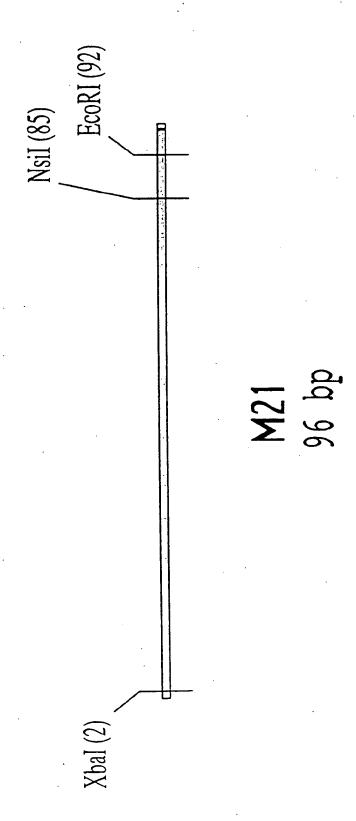
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ATGAAGTGCA ATTGGAATTC TACTTCACGT TAACCTTAAG

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AAGAAGAACG TTCTTGC TTATAGCGTA AATATCGCAT TATGAAAAAG ATACTTTTC GAGGTGATTT CTCCACTAAA TCTAGAGGTT AGATCTCCAA

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TGCATACGCT AACGATGTTT TTGCTACAAA

GTTTTTCTA CAAAAAAGAT

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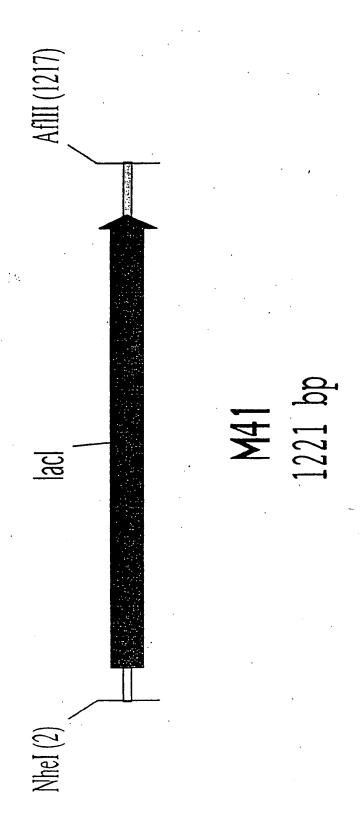


Figure 35a: Functional maps and sequences of additional pCAL vector modules and pCAL vectors (continued)

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<b>—</b>	GCTAGCATCG CGATCGTAGC	AATGGCGCAA TTACCGCGTT	AACCTTTCGC TTGGAAAGCG	GGTATGGCAT CCATACCGTA	GATAGCGCCC CTATCGCGGG	
51	GGAAGAGAGT CCTTCTCTCA	CAATTCAGGG GTTAAGTCCC	TGGTGAATGT ACCACTTACA	GAAACCAGTA CTTTGGTCAT	ACGTTATACG TGCAATATGC	
101	ATGTCGCAGA TACAGCGTCT	GTATGCCGGT	GTCTCTTATC CAGAGAATAG	AGACCGTTTC TCTGGCAAAG	CCGCGTGGTG GGCGCACCAC	
151	AACCAGGCCA TTGGTCCGGT	GCCACGTTTC CGGTGCAAAG	TGCGAAAACG ACGCTTTTGC	CGGGAAAAAG GCCCTTTTTC	TGGAAGCGGC ACCTTCGCCG	
201	GATGGCGGAG	CTGAATTACA GACTTAATGT	TTCCTAACCG AAGGATTGGC	CGTGGCACAA GCACCGTGTT	CAACTGGCGG GTTGACCGCC	
251	GCAAACAGTC CGTTTGTCAG	GTTGCTGATT CAACGACTAA	GGCGTTGCCA CCGCAACGGT	CCTCCAGTCT GGAGGTCAGA	GGCCCTGCAC CCGGGACGTG	
301	GCGCCGTCGC	AAATTGTCGC TTTAACAGCG	GGCGATTAAA CCGCTAATTT	TCTCGCGCCG	ATCAACTGGG TAGTTGACCC	

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Figure 35a: Functional maps and sequences of additional pCAL vector modules and pCAL vectors (continued)

	TGCCATGTCC ACGGTACAGG	GCGACTGGAG CGCTGACCTC	GAACGGGAAG CTTGCCCTTC	GCCGATAGCG CGGCTATCGC	ATCAAATTCA TAGTTTAAGT	701
	CTCACTCGCA GAGTGAGCGT	GCATAAATAT CGTATTTATA	TGGCTGGCTG	CGTCTGCGTC GCAGACGCAG	TGTCTCGGCG	651
	CATTAAGTTC GTAATTCAAG	TTAGCTGGCC AATCGACCGG	AATCGCGCTG TTAGCGCGAC	GCCACCAGCA CGGTGGTCGT	GTCGCATTGG CAGCGTAACC	601
	GGAGCATCTG CCTCGTAGAC	GACTGGGCGT CTGACCCGCA	GACGGTACGC	CTCCCATGAG	GTATTATTT CATAATAAAA	551
	CCCATCAACA GGGTAGTTGT	TGACCAGACA ACTGGTCTGT	TTGATGTCTC AACTACAGAG	GCGTTATTTC CGCAATAAAG	TAATGTTCCG ATTACAAGGC	501
·	CTGCCTGCAC GACGGACGTG	GCTGTGGAAG CGACACCTTC	GGATGCTATT CCTACGATAA	TGGATGACCA ACCTACTGGT	AACTATCCGC TTGATAGGCG	451
	GCTGATTATT CGACTAATAA	GTGTCAGTGG CACAGTCACC	CTCGCGCAAC GAGCGCGTTG	GCACAATCTT CGTGTTAGAA	AAGCGGCGGT TTCGCCGCCA	401
	GAAGCCTGTA CTTCGGACAT	AAGCGGCGTC TTCGCCGCAG	TGGTAGAACG ACCATCTTGC	GTCGTGTCGA CAGCACAGCT	TGCCAGCGTG ACGGTCGCAC	351

Figure 35a: Functional maps and sequences of additional pCAL vector modules and pCAL vectors (continued)

751	GGTTTTCAAC	AAACCATGCA	AATGCTGAAT	GAGGGCATCG	TTCCCACTGC
	CCAAAAGTTG	TTTGGTACGT	TTACGACTTA	CTCCCGTAGC	AAGGGTGACG
	GATGCTGGTT CTACGACCAA	GCCAACGATC	AGATGGCGCT TCTACCGCGA	GGGCGCAATG CCCGCGTTAC	CGTGCCATTA GCACGGTAAT
	CCGAGTCCGG	GCTGCGCGTT	GGTGCGGACA	TCTCGGTAGT	GGGATACGAC
	GGCTCAGGCC	CGACGCGCAA	CCACGCCTGT	AGAGCCATCA	CCCTATGCTG
	GATACCGAGG	ACAGCTCATG	TTATATCCCG	CCGCTGACCA	CCATCAAACA
	CTATGGCTCC	TGTCGAGTAC	AATATAGGGC	GGCGACTGGT	GGTAGTTTGT
	GGATTTTCGC CCTAAAAGCG	CTGCTGGGGC	AAACCAGCGT TTTGGTCGCA	GGACCGCTTG CCTGGCGAAC	CTGCAACTCT GACGTTGAGA
	CTCAGGGCCA GAGTCCCGGT	GGCGGTGAAG	GGCAATCAGC	TGTTGCCCGT ACAACGGGCA	CTCACTGGTG
	AAAAGAAAAA TTTTCTTTTT	CCACCCTGGC	TCCCAATACG	CAAACCGCCT GTTTGGCGGA	CTCCCGCGC
	GTTGGCCGAT	TCACTGATGC	AGCTGGCACG	ACAGGTTTCC	CGACTGGAAA
	CAACCGGCTA	AGTGACTACG	TCGACCGTGC	TGTCCAAAGG	GCTGACCTTT

GGAGGCCGTT CCTCCGGCAA CTTCCTGACA TATTTTCGCC GAAGGACTGT ATAAAAGCGG AGGCTACCCG TCCGATGGGC GCGGCCAGTG CGCCCGTCAC 1151

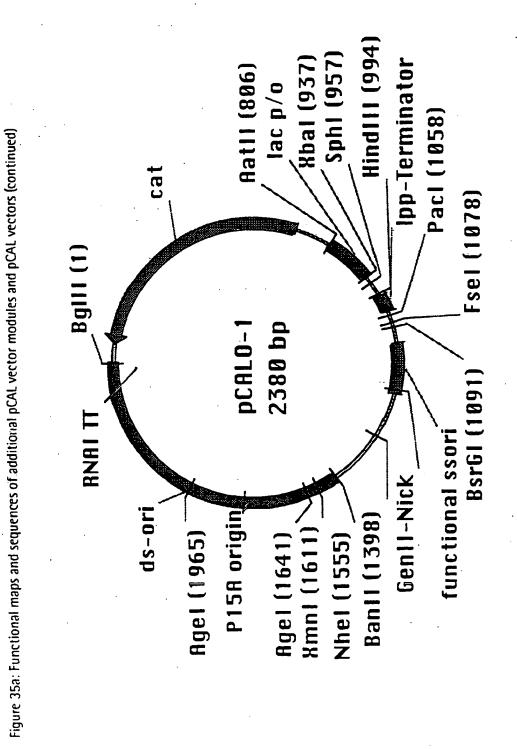
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<u>ပ</u> GCCCACTTAA TTGTTTGCA

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CGGGTGAATT AACAAAACGT

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Figure 35a: Functional maps and sequences of additional pCAL vector modules and pCAL vectors (continued)

pCALO-1: Bglii

TTTTTTAAT AAAAAATTA AGGGCACCAA TAACTGCCTT ATTGACGGAA TCCCGTGGTT CAGGCGTTTA GTCCGCAAAT CTAGATCGTG GATCTAGCAC

AATTCGTAAG TTAAGCATTC AACATTAAGT TTGTAATTCA CGCAGTACTG GCGTCATGAC TGCCACTCAT ACGGTGAGTA 9990999999 CGCCCGCCC 51

TTAGCGGTCG AATCGCCAGC CTACTTGGAC GATGAACCTG CAAACGGCAT GTTTGCCGTA CTTCGGTAGT GAAGCCATCA ACGGCTGTAC TGCCGACATG 101

CCTTGTCGCC TTGCGTATAA TATTTGCCCA GGAACAGCGG AACGCATATT ATAAACGGGT

ATCACTTTTG

TAGTGAAAAC

AAACTGGTGA TTTGACCACT GTTTAAATCA CAAATTTAGT TATTGGCTAC ATAACCGATG AAGTTGTCCA TTCAACAGGT CCCCGCTTC GGGGCGAAG 201

TTATTTGGGA AATAAACCCT ACATATTCTC TGTATAAGAG GAGACGAAAA CTCTGCTTTT CCCTAACCGA GGGATTGGCT TTGAGTGGGT AACTCACCCA 251

CTTGCGAATA GAACGCTTAT GTGCGGTGTA CACGCCACAT TTCACCGTAA AAGTGGCATT TCCGGTCCAA AGGCCAGGTT TTAGGGAAAT AATCCCTTTA 301

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CCGTAGTCGT

GGCATCAGCA

AL vectors (continued)
CAL vector modules and pC
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Figure 35a: Functior

ATCGTCGTG GAAAACGG CCTTTTGATT AGAAAGTAA TTACATTTTCCC CGTTGACTG AATTTTTCC CGTTGACTG AATTTTTCC CGTTGACTG ATCAACGGT TACAACGGT	ATCGTCGTG GTATTCACTC TAGCAGCAC CATAAGTGAG GGAAAACGC ACATTGTTCC TCTTTCATT GCCATACGGA AATGTGAAT AAAGGCCGGA TTAAAAAAGG CCGTAATGCCT AATTTTTCC GCCATTATGC AATTTTTCC GCCATTATGC AATTTTTCC GCCATTATCC AATTTTTCC GCCATTATCC AATTTTTCC GCCATTATCC AATTTTTTCC GCCATTATCC AATTTTTTCC GCCATTATCCA TAGTTGACTG ACTTTACGGA TAGTTGCCA CCATATAGGT
AATCGTCGTG TTAGCAGCAC TGGAAAACGG ACCTTTTGCC GTCTTTCATT CAGAAAGTAA GAATGTGAAT TTTAAAAAAGG AAATTTTTCC TCGTTGACTGA TCGTTGACTGAAA TATCAACGGT	
	GTATTCACTC CATAAGTGAG ACATTGTTCC GCCATACGGA CGGTATGCCT AAAGGCCGGA TTTCCGGCCT CCGTAATATC GGCATTATGGA TGAAATGCCT ACTTTACGGA CCATATACGA CCATATATCCA

TTTGTCTGCC

GCTGTAAAAA

CGACATTTTT

GCAGATTGTG

GAAAAATGGC CTTTTTACCG

CCTGTGAAGT

1001

ATAAGCTTGA TATTCGAACT

ATACGAAGTT

TATGCTTCAA

AATGTACGCT TTACATGCGA

AACTTCGTAT TTGAAGCATA

CGCATGCCAT

951

Figure 35a: Functional maps and sequences of additional pCAL vector modules and pCAL vectors (continued)

	HindIII				SphI	
	TGGGGGGGGG	CTTAAAGATC	GGTACTAATG	TGTCGATACT	GTGTGTCCTT	
•	ACCCCCCCC	ACAGCTATGA CCATGATTAC GAATTTCTAG ACCCCCCCC	CCATGATTAC	ACAGCTATGA	CACACAGGAA	901
		Xbal				
	ATAACAATTT TATTGTTAAA	TTGTGTGGAA TTGTGAGCGG ATAACAATTT AACACCTT AACACTCGCC TATTGTTAAA	SGCTCGTATG TTGTGTGGAA	GGCTCGTATG CCGAGCATAC	TTATGCTTCC AATACGAAGG	851
	GGCACCCCAG GCTTTACACT CCGTGGGGTC CGAAATGTGA	GGCACCCCAG CCGTGGGGTC	TCACTCATTA AGTGAGTAAT	GTGAGTTAGC CACTCAATCG	GACGTCTAAT CTGCAGATTA	801
•		)		G L CAC L L CAC L L CAC	AatII	
	AACCTCACCC TTGGAGTGGG	TTCATTATGG TGAAAGTTGG AACCTCACCC AAGTAATACC ACTTTCAACC TTGGAGTGGG	TTCATTATGG AAGTAATACC	GTGATCTTAT CACTAGAATA	ACGCCCGGTA TGCGGGCCAT	751

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Figure 35a: Functional maps and sequences of additional pCAL vector modules and pCAL vectors (continued)

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1051	GTTTAATTAA CAAATTAATT	AGGGGGGGGG	GGGCCGGCCT	GGGGGGGGT	GTACATGAAA CATGTACTTT	
1101	TTGTAAACGT AACATTTGCA	TAATATTTTG ATTATAAAAC	TTAAAATTCG	CGTTAAATTT GCAATTTAAA	TTGTTAAATC AACAATTTAG	
1151	AGCTCATTTT TCGAGTAAAA	TTAACCAATA AATTGGTTAT	GGCCGAAATC CCGGCTTTAG	GGCAAAATCC CCGTTTTAGG	CTTATAAATC GAATATTTAG	•
1201	AAAAGAATAG TTTTCTTATC	ACCGAGATAG TGGCTCTATC	GGTTGAGTGT CCAACTCACA	TGTTCCAGTT ACAAGGTCAA	TGGAACAAGA ACCTTGTTCT	
1251	GTCCACTATT CAGGTGATAA	GTCCACTATT AAAGAACGTG CAGGTGATAA TTTCTTGCAC	GACTCCAACG	TCAAAGGGCG AGTTTCCCGC	AAAAACCGTC TTTTGGCAG	
1301	TATCAGGGCG	ATGGCCCACT TACCGGGTGA	ACGAGAACCA TGCTCTTGGT	TCACCCTAAT AGTGGGATTA	CAAGTTTTTT GTTCAAAAAA	
,				•	BanII	
1351	GGGGTCGAGG	TGCCGTAAAG ACGGCATTTC	CACTAAATCG GTGATTTAGC	GAACCCTAAA CTTGGGATTT	GGGAGCCCCC	

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AA TGCTTGCCCC	GG GAAGTGAGAG CC CTTCACTCTC	CT GACAAGCATC GA CTGTTCGTAG	AC AGGACTATAA TG TCCTGATATT	CT CTCCTGTTCC GA GAGGACAAGG	CG CGTTTGTCTC		SCC TTATCCGGTA
ntinued) CTTTACCGAA	ACTTAACAGG TGAATTGTCC	CCGCCCCCT	GAAACCCGAC CTTTGGGCTG	CTCCTGCGCT GAGGACGCGA	GTTATGGCCG	GCAGTTCGCT	CCGCTGCGCC
ules and pCAL vectors (cor	CCAGGAAGAT GGTCCTTCTA	TCCATAGGCT AGGTATCCGA	CAGTGGTGGC GTCACCACCG	TGGCGGCTCC	TCATTCCGCT	TTCCGGGTAG AAGGCCCATC	TTCAGTCCGA
litional pCAL vector modu AGCAAGCTGA	CTGGAAGATG GACCTTCTAC	AAGCCGTTTT TTCGGCAAAA	ACGCTCAAAT TGCGAGTTTA	CGTTTCCCCC	AgeI ~~~~~~ TTTACCGGTG	TGACACTCAG ACTGTGAGTC	GAACCCCCCG
Figure 35a: Functional maps and sequences of additional pCAL vector modules and pCAL vectors (continued) GATGCGAGCC AGCAAGCTGA CGCCGCTCGC CTT'	CGGAGATTTC GCCTCTAAAG	GGCCGCGGCA	ACGAAATCTG TGCTTTAGAC	AGATACCAGG TCTATGGTCC	TGCCTTTCGG	ACGGAAAGCC ATTCCACGCC TAAGGTGCGG	CTGTATGCAC
sa: Functional	1751	1801	1851	1901	1951	2001	2051
Figure 35			SUE	3STITUTE SH 161 / 2	EET (RULE 26) 04		·

Figure 35a: Functional maps and sequences of additional pCAL vector modules and pCAL vectors (continued)

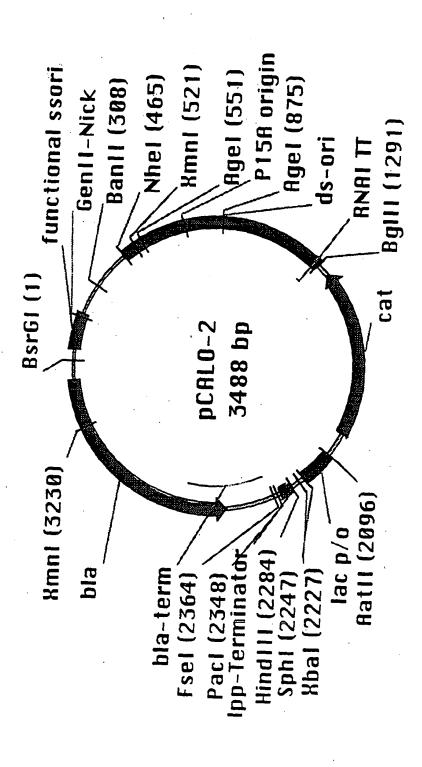
	1401	GATTTAGAGC CTAAATCTCG	TTGACGGGGA AACTGCCCCT	AAGCCGGCGA	AAGCCGGCGA ACGTGGCGAG TTCGGCCGCT TGCACCGCTC	AAAGGAAGGG TTTCCTTCCC	
	1451	AAGAAAGCGA TTCTTTCGCT	AAGGAGCGGG TTCCTCGCCC	CGCTAGGGCG	CTGGCAAGTG GACCGTTCAC	TAGCGGTCAC ATCGCCAGTG	
,	1501	GCTGCGCGTA	ACCACCACAC TGGTGGTGTG	CCGCCGCGCT	TAATGCGCCG ATTACGCGGC	CTACAGGGCG GATGTCCCGC	
	1551	Nhel CGTGCTAGCG GCACGATCGC	GAGTGTATAC CTCACATATG	TGGCTTACTA	TGTTGGCACT ACAACCGTGA	GATGAGGGTG	
CH E		IrmX	II			AgeI	
00)	1601	TCAGTGAAGT GAGT GAGT GAGT GAGT GAGTCACTTCA	GCTTCATGTG	GCAGGAGAAA CGTCCTCTTT	AAAGGCTGCA TTTCCGACGT	CCGGTGCGTC	
•	1651	AGCAGAATAT TCGTCTTATA	GTGATACAGG CACTATGTCC	ATATATTCCG TATATAAGGC	CTTCCTCGCT	CACTGACTCG GTGACTGAGC	
	1701	CTACGCTCGG	TCGTTCGACT	GCGGCGAGCG	GAAATGGCTT	ACGAACGGGG	

Figure 35a: Functional maps and sequences of additional pCAL vector modules and pCAL vectors (continued)

	2101	ACTATCGTCT TGATAGCAGA	TGAGTCCAAC ACTCAGGTTG	CCGGAAAGAC GGCCTTTCTG	ATGCAAAAGC TACGTTTTCG	ACCACTGGCA TGGTGACCGT	
	2151	GCAGCCACTG CGTCGGTGAC	GTAATTGATT CATTAACTAA	TAGAGGAGTT	AGTCTTGAAG TCAGAACTTC	TCATGCGCCG AGTACGCGGC	
٠ (	2201	GTTAAGGCTA	AACTGAAAGG TTGACTTTCC	ACAAGTTTTA TGTTCAAAAT	GTGACTGCGC CACTGACGCG	TCCTCCAAGC AGGAGGTTCG	
SUBSTITUTE	2251	CAGTTACCTC	GGTTCAAAGA CCAAGTTTCT	GTTGGTAGCT	CAGAGAACCT GTCTCTTGGA	ACGAAAAACC TGCTTTTTGG	
SHEET (RU	. 2301	GCCCTGCAAG CGGGACGTTC	GCGGTTTTTT CGCCAAAAAA	CGTTTTCAGA GCAAAAGTCT	GCAAGAGATT CGTTCTCTAA	ACGCGCAGAC TGCGCGTCTG	
LE 26)				BglII			
	2351	CAAAACGATC GTTTTGCTAG	TCAAGAAGAT AGTTCTTCTA	CATCTTATTA GTAGAATAAT			

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Figure 35a: Functional maps and sequences of additional pCAL vector modules and pCAL vectors (continued)



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Figure 35a: Functional maps and sequences of additional pCAL vector modules and pCAL vectors (continued)

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GCAATTTAAA CGTTAAATTT TTAAAATTCG AATTTTAAGC TAATATTTTG ATTATAAAAC TTGTAAACGT AACATTTGCA GTACATGAAA CATGTACTTT

CCGTTTTAGG GGCAAAATCC GGCCGAAATC CCGGCTTTAG TTAACCAATA AATTGGTTAT AGCTCATTTT TCGAGTAAAA TTGTTAAATC AACAATTTAG 51

ACAAGGTCAA TGTTCCAGTT GGTTGAGTGT CCAACTCACA ACCGAGATAG TGGCTCTATC AAAAGAATAG TTTTCTTATC CTTATAAATC GAATATTTAG 101

TCAAAGGGCG AGTTTCCCGC CTGAGGTTGC GACTCCAACG AAAGAACGTG TTTCTTGCAC GTCCACTATT CAGGTGATAA TGGAACAAGA ACCTTGTTCT TCACCCTAAT AGTGGGATTA ACGAGAACCA TGCTCTTGGT ATGGCCCACT TACCGGGTGA TATCAGGGCG ATAGTCCCGC AAAAACCGTC TTTTGGCAG 201

GAACCCTAAA CTTGGGATTT CACTAAATCG GTGATTTAGC TGCCGTAAAG ACGGCATTTC GGGGTCGAGG CCCCAGCTCC CAAGTTTTTT GTTCAAAAA 251

## BanII

GGGAGCCCCC GATTTAGAGC TTGACGGGGA AAGCCGGCGA ACGTGGCGAG 301

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dditional pCAL vector modules and pCAL vectors (continued)	
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qure 35a: Functional maps and sequences of additional pCAL	
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Figure 35a: Functional maps and sequences of additional pCAL vector modules and pCAL vectors (continued)

ATGCAAAAGC TACGTTTTCG	AGTCTTGAAG TCAGAACTTC	GTGACTGCGC CACTGACGCG	CAGAGAACCT GTCTCTTGGA	GCAAGAGATT CGTTCTCTAA	IJ	GATCTAGCAC CTAGATCGTG	000000000000000000000000000000000000000
				•	BglII	}	
CCGGAAAGAC GGCCTTTCTG	TAGAGGAGTT ATCTCCTCAA	ACAAGTTTTA TGTTCAAAAT	GTTGGTAGCT CAACCATCGA	CGTTTTCAGA GCAAAAGTCT		CATCTTATTA GTAGAATAAT	AAAAAATTA TTTTTTAAT
TGAGTCCAAC ACTCAGGTTG	GTAATTGATT CATTAACTAA	AACTGAAAGG TTGACTTTCC	GGTTCAAAGA CCAAGTTTCT	GCCCTGCAAG GCGGTTTTTT CGGGACGTTC CGCCAAAAAA		TCAAGAAGAT AGTTCTTCTA	TAACTGCCTT ATTGACGGAA
ACTATCGTCT TGATAGCAGA	GCAGCCACTG	GTTAAGGCTA CAATTCCGAT	CAGTTACCTC GTCAATGGAG	GCCCTGCAAG CGGGACGTTC		CAAAACGATC GTTTTGCTAG	AGGGCACCAA TCCCGTGGTT
TTATCCGGTA AATAGGCCAT	ACCACTGGCA TGGTGACCGT	TCATGCGCCG	TCCTCCAAGC	ACGAAAAACC TGCTTTTTGG		ACGCGCAGAC TGCGCGTCTG	CAGGCGTTTA GTCCGCAAAT
1001	1051	1101	1151	1201		1251	1301

TGCCGACATG ACGGCTGTAC	GGCATCAGCA CCGTAGTCGT	GGGGCGAAG CCCCCGCTTC	AACTCACCCA TTGAGTGGGT	TTAGGGAAAT AATCCCTTTA	TATGTGTAGA ATACACATCT	AAAACGTTTC TTTTGCAAAG	TCCCATATCA AGGGTATAGT
AGCATTC	AATCGCCAGC ( TTAGCGGTCG (	TAGTGAAAAC O	AAACTGGTGA I	AATAAACCCT TTATTTGGGA	CTTGCGAATA GAACGCTTAT	CAGAGCGATG	GTGAACACTA
dditional pCAL vector modules and pCAL vectors (continued) CGCAGTACTG TTGTAATTCA TTA GCGTCATGAC AACATTAAGT AAT	GATGAACCTG CTACTTGGAC	TATTTGCCCA	GTTTAAATCA CAAATTTAGT	ACATATTCTC TGTATAAGAG	CACGCCACAT	GTATTCACTC CATAAGTGAG	TGTAACAAGG ACATTGTTCC
ditional pCAL vector modu CGCAGTACTG GCGTCATGAC	CAAACGGCAT	TTGCGTATAA AACGCATATT	TATTGGCTAC	GAGACGAAAA CTCTGCTTTT	TTCACCGTAA	AATCGTCGTG TTAGCAGCAC	TGGAAAACGG ACCTTTTGCC
Figure 35a: Functional maps and sequences of add 1351 TGCCACTCAT ACGGTGAGTA	GAAGCCATCA CTTCGGTAGT	CCTTGTCGCC GGAACAGCGG	AAGTTGTCCA TTCAACAGGT	GGGATTGGCT CCCTAACCGA	AGGCCAGGTT TCCGGTCCAA	AACTGCCGGA TTGACGGCCT	AGTTTGCTCA TCAAACGAGT
5a: Functional 1351	1401	1451	1501	1551	1601	1651	1701
Figure 3			SUBSTIT	UTE SHEET 168 / 204	(RULE 26)		

AGCATTCATC TCGTAAGTAG	GCTTATTTT CGAATAAAAA	GTCTGGTTAT CAGACCAATA	TTTACGATGC AAATGCTACG	TCTCCATTTT AGAGGTAAAA	ACGCCCGGTA TGCGGGCCAT	Aatii ~~~~~~ GACGTCTAAT CTGCAGATTA	TTATGCTTCC
CCGGGTG	TAAAACTTGT (ATTTGAACA)	CAGCTGAACG G	CAAAATGTTC GTTTTACAAG	GTGATTTTTT CACTAAAAAA	CTCAAAAAT GAGTTTTTTA	AACCTCACCC	GCTTTACACT
additional pCAL vector modules and pCAL vectors (continued) GTCTTTCATT GCCATACGGA ACT( CAGAAAGTAA CGGTATGCCT TGA	AAAGGCCGGA TTTCCGGCCT	CCGTAATATC GGCATTATAG	TGAAATGCCT ACTTTACGGA	GGTATATCCA CCATATAGGT	ATCTCGATAA TAGAGCTATT	TGAAAGTTGG ACTTTCAACC	GGCACCCCAG
ditional pCAL vector mod GTCTTTCATT CAGAAAGTAA	GAATGTGAAT CTTACACTTA	TTTAAAAAGG AAATTTTTCC	AGCAACTGAC	TATCAACGGT ATAGTTGCCA	GCTCCTGAAA CGAGGACTTT	TTCATTATGG AAGTAATACC	TCACTCATTA
Figure 35a: Functional maps and sequences of ad 1751 CCAGCTCACC GGTCGAGTGG	AGGCGGGCAA TCCGCCCGTT	CTTTACGGTC GAAATGCCAG	AGGTACATTG TCCATGTAAC	CATTGGGATA GTAACCCTAT	AGCTTCCTTA TCGAAGGAAT	GTGATCTTAT CACTAGAATA	GTGAGTTAGC
a: Functional 1751	1801	1851	1901	1951	2001	2051	2101
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		×.*		•			•
AATACGAAGG	CACACAGGAA GTGTGTCCTT	Sphi	CGCATGCCAT	CCTGTGAAGT GGACACTTCA	PacI ~~~~~~~ GTTTAATTAA CAAATTAATT		TCCTTTGATC AGGAAACTAG
ntinued) CGAAATGTGA	ATAACAATTT TATTGTTAAA		ACCCCCCCCC	HindIII ~~~~~~ ATAAGCTTGA TATTCGAACT	TTTGTCTGCC		CTCAAGAAGA GAGTTCTTCT
ules and pCAL vectors (co	TTGTGAGCGG	XbaI	GAATTTCTAG CTTAAAGATC	ATACGAAGTT TATGCTTCAA	CGACATTTTT GCTGTAAAAA		CAAAAAGGAT GTTTTTCCTA
ditional pCAL vector mod AGTGAGTAAT	TTGTGTGGAA		CCATGATTAC GGTACTAATG	AATGTACGCT TTACATGCGA	GCAGATTGTG	FseI	CGGCCATTAT GCCGGTAATA
Figure 35a: Functional maps and sequences of additional pCAL vector modules and pCAL vectors (continued) CACTCAATCG AGTGAGTAAT CGGGGGTC CGA	GGCTCGTATG		ACAGCTATGA TGTCGATACT	AACTTCGTAT TTGAAGCATA	GAAAAATGGC CTTTTTACCG	전	50000000000000000000000000000000000000
5a: Functional	2151		2201	2251	2301		2351
jure 3			S	SUBSTITUTE SHEET	(RULE 26)		
Fig				170 / 204			

Figure 35a: Functional maps and sequences of additional pCAL vector modules and pCAL vectors (continued)

	2401	TTTTCTACGG	GGTCTGACGC CCAGACTGCG	TCAGTGGAAC AGTCACCTTG	GAAAACTCAC CTTTTGAGTG	GTTAAGGGAT CAATTCCCTA	
	2451	TTTGGTCATG AAACCAGTAC	AGATTATCAA TCTAATAGTT	AAAGGATCTT TTTCCTAGAA	CACCTAGATC GTGGATCTAG	CTTTTAAATT GAAAATTTAA	
9	2501	AAAAATGAAG TTTTTACTTC	TTTTAAATCA AAAATTTAGT	ATCTAAAGTA TAGATTTCAT	TATATGAGTA ATATACTCAT	AACTTGGTCT TTGAACCAGA	
HRSTITLITE	2551	GACAGTTACC CTGTCAATGG	CAATGCTTAA GTTACGAATT	TCAGTGAGGC	ACCTATCTCA TGGATAGAGT	GCGATCTGTC CGCTAGACAG	
CHEET (DIII	2601	TATTTCGTTC ATAAAGCAAG	ATCCATAGTT TAGGTATCAA	GCCTGACTCC CGGACTGAGG	CCGTCGTGTA GGCAGCACAT	GATAACTACG CTATTGATGC	
E 26)	2651	ATACGGGAGG TATGCCCTCC	GCTTACCATC CGAATGGTAG	TGGCCCCCAGT ACCGGGGTCA	GCTGCAATGA	TACCGCGAGA	
	2701	CCCACGCTCA GGGTGCGAGT	CCGGCTCCAG GGCCGAGGTC	ATTTATCAGC TAAATAGTCG	AATAAACCAG TTATTTGGTC	CCAGCCGGAA GGTCGGCCTT	
	2751	GGGCCGAGCG	CAGAAGTGGT	CCTGCAACTT GGACGTTGAA	TATCCGCCTC ATAGGCGGAG	CATCCAGTCT	

Figure 35a: Functional maps and sequences of additional pCAL vector modules and pCAL vectors (continued)

	2801	ATTAACTGTT TAATTGACAA	GCCGGGAAGC	TAGAGTAAGT ATCTCATTCA	AGTTCGCCAG TCAAGCGGTC	TTAATAGTTT AATTATCAAA	
	2851	GCGCAACGTT	GTTGCCATTG CAACGGTAAC	CTACAGGCAT GATGTCCGTA	CGTGGTGTCA GCACCACAGT	CGCTCGTCGT GCGAGCAGCA	•
S	2901	TTGGTATGGC AACCATACCG	TTCATTCAGC AAGTAAGTCG	TCCGGTTCCC	AACGATCAAG TTGCTAGTTC	GCGAGTTACA CGCTCAATGT	•
SUBSTITUTE	2951	TGATCCCCCA	TGTTGTGCAA ACAACACGTT	AAAAGCGGTT TTTTCGCCAA	AGCTCCTTCG TCGAGGAAGC	GTCCTCCGAT CAGGAGGCTA	
SHEET (RU!	3001	CGTTGTCAGA GCAACAGTCT	AGTAAGTTGG TCATTCAACC	CCGCAGTGTT GGCGTCACAA	ATCACTCATG TAGTGAGTAC	GTTATGGCAG CAATACCGTC	
E 26)	3051	CACTGCATAA GTGACGTATT	TTCTCTTACT AAGAGAATGA	GTCATGCCAT	CCGTAAGATG GGCATTCTAC	CTTTTCTGTG	
	3101	ACTGGTGAGT TGACCACTCA	ACTCAACCAA TGAGTTGGTT	GTCATTCTGA CAGTAAGACT	GAATAGTGTA CTTATCACAT	TGCGGCGACC	
	3151	GAGTTGCTCT	TGCCCGGCGT ACGGGCCGCA	CAATACGGGA GTTATGCCCT	TAATACCGCG ATTATGGCGC	CCACATAGCA GGTGTATCGT	

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Figure 35a: Functional maps and sequences of additional pCAL vector modules and pCAL vectors (continued)

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GCGAAAACTC	CCACTCGCGC	TCTGGGTGAG	GGCGACACGG	GAAGCATTTA
CGCTTTTGAG	GGTGAGCGCG	AGACCCACTC	CCGCTGTGCC	CTTCGTAAAT
GTTCTTCGGG	TCGATGTAAC	CACCAGCGTT	AGGGAATAAG	TACTCATACT CTTCCTTTTT CAATATTATT
CAAGAAGCCC	AGCTACATTG	GTGGTCGCAA	TCCCTTATTC	ATGAGTATGA GAAGGAAAAA GTTATAATAA
AGTGCTCATC ATTGGAAAAC GTTCTTCGGG GCGAAAACTC	GAGATCCAGT	CTTTTACTTT	AAGGCAAAAT GCCGCAAAAA AGGGAATAAG	CTTCCTTTTT
TCACGAGTAG TAACCTTTTG CAAGAAGCCC CGCTTTTGAG	CTCTAGGTCA	GAAAATGAAA	TTCCGTTTTA CGGCGTTTTT TCCCTTATTC	GAAGGAAAAA
AGTGCTCATC	TACCGCTGTT	TCCTCAGCAT	AAGGCAAAAT	TACTCATACT CTTCCTTTTT ATGAGTATGA GAAGGAAAAA
TCACGAGTAG	ATGGCGACAA	AGGAGTCGTA	TTCCGTTTTA	
GAACTTTAAA	TCAAGGATCT	ACCCAACTGA	CAAAAACAGG	AAATGTTGAA
CTTGAAATTT	AGTTCCTAGA	TGGGTTGACT	GTTTTTGTCC	TTTACAACTT
3201	3251	3.301	3351	3401
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## BsrGI

ATTTGAAT TAAACTTA TCAGGGTTAT TGTCTCATGA GCGGATACAT CGCCTATGTA AGTCCCAATA ACAGAGTACT 3451

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(pp-Terminator Paci (298) Hind 111 (234) Fsel (314 Sph! (197) bla-term **Kbal (177)** Figure 35a: Functional maps and sequences of additional pCAL vector modules and pCAL vectors (continued) lac p/o **Kmnl** (1180) bla **Hatil** (46) pCALO-3 2728 bp BsrGI (1439) Bg111 (1 RNAI T functional ssori GenII-Nick ds-ori **Agel** (2513) P15A origin **Banll** (1746) **Kmnl (1959)** Age! (1989) Nhel (1903)

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CCTGTGAAGT

ATAAGCTTGA TATTCGAACT

AACTTCGTAT AATGTACGCT ATACGAAGTT TTGAAGCATA TTACATGCGA TATGCTTCAA

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Figure 35a: Functional maps and sequences of additional pCAL vector modules and pCAL vectors (continued)

Aatii	AT GACGTCTAAT	TCACTCATTA GGCACCCCAG GCTTTACACT TTATGCTTCC AGTGAGTAAT CCGTGGGGTC CGAAATGTGA AATACGAAGG	TTGTGAGCGG ATAACAATTT CACACAGGAA AACACTCGCC TATTGTTAAA GTGTGTCCTT	Sphi	ACCCCCCCC CGCATGCCAT TGGGGGGGG GCGTACGGTA
	ACGAAGTTAT TGCTTCAATA	GCTTTACA CGAAATGT	ATAACAATTT TATTGTTAAA	. }	ACCCCCC TGGGGGGG
	TGTATGCTAT ACGAAGTTAT ACATACGATA TGCTTCAATA	GGCACCCCAG CCGTGGGGGTC	TTGTGAGCGG	XbaI	GAATTTCTAG ACCCCCCCC CTTAAAGATC TGGGGGGGG
	CTTCGTATAA GAAGCATATT	TCACTCATTA AGTGAGTAAT	TTGTGTGGAA AACACACCTT		CCATGATTAC GGTACTAATG
pCALO-3: BglII	GATCTCATAA CTAGAGTATT	GTGAGTTAGC CACTCAATCG	GGCTCGTATG CCGAGCATAC		ACAGCTATGA TGTCGATACT
pCAL	₩	51	101		151

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Figure 35a: Functional maps and sequences of additional pCAL vector modules and pCAL vectors (continued)

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GTTTAATTAA CAAATTAATT		TCCTTTGATC AGGAAACTAG	GTTAAGGGAT CAATTCCCTA	CTTTTAAATT GAAAATTTAA	AACTTGGTCT TTGAACCAGA	GCGATCTGTC CGCTAGACAG	GATAACTACG CTATTGATGC
TTTGTCTGCC AAACAGACGG		CTCAAGAAGA GAGTTCTTCT	GAAACTCAC CTTTTGAGTG	CACCTAGATC GTGGATCTAG	TATATGAGTA ATATACTCAT	ACCTATCTCA	CCGTCGTGTA
CGACATTTTT GCTGTAAAAA		CAAAAAGGAT GTTTTTCCTA	TCAGTGGAAC AGTCACCTTG	AAAGGATCTT TTTCCTAGAA	ATCTAAAGTA TAGATTTCAT	TCAGTGAGGC AGTCACTCCG	GCCTGACTCC CGGACTGAGG
GCAGATTGTG CGTCTAACAC	eI	CGGCCATTAT	GGTCTGACGC CCAGACTGCG	AGATTATCAA TCTAATAGTT	TTTTAAATCA AAAATTTAGT	CAATGCTTAA GTTACGAATT	ATCCATAGTT TAGGTATCAA
GAAAAATGGC CTTTTTACCG	អ ទ	0 5000000000000000000000000000000000000	TTTTCTACGG AAAAGATGCC	TTTGGTCATG AAACCAGTAC	AAAAATGAAG TTTTTACTTC	GACAGTTACC CTGTCAATGG	TATTTCGTTC ATAAAGCAAG
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TACCGCGAGA ATGGCGCTCT	CCAGCCGGAA GGTCGGCCTT	CATCCAGTCT GTAGGTCAGA	TTAATAGTTT AATTATCAAA	CGCTCGTCGT	GCGAGTTACA	GTCCTCCGAT	GTTATGGCAG CAATACCGTC
GCTGCAATGA CGACGTTACT	AATAAACCAG TTATTTGGTC	TATCCGCCTC	AGTTCGCCAG TCAAGCGGTC	CGTGGTGTCA	AACGATCAAG TTGCTAGTTC	AGCTCCTTCG TCGAGGAAGC	ATCACTCATG TAGTGAGTAC
TGGCCCCAGT ACCGGGGGTCA	ATTTATCAGC TAAATAGTCG	CCTGCAACTT GGACGTTGAA	TAGAGTAAGT ATCTCATTCA	CTACAGGCAT GATGTCCGTA	TCCGGTTCCC	AAAAGCGGTT TTTTCGCCAA	CCGCAGTGTT GGCGTCACAA
GCTTACCATC CGAATGGTAG	CCGGCTCCAG GGCCGAGGTC	CAGAAGTGGT GTCTTCACCA	GCCGGGAAGC CGGCCCTTCG	GTTGCCATTG CAACGGTAAC	TTCATTCAGC AAGTAAGTCG	TGTTGTGCAA ACAACACGTT	AGTAAGTTGG TCATTCAACC
ATACGGGAGG	CCCACGCTCA GGGTGCGAGT	GGGCCGAGCG CCCGGCTCGC	ATTAACTGTT TAATTGACAA	GCGCAACGTT CGCGTTGCAA	TTGGTATGGC AACCATACCG	TGATCCCCCA	CGTTGTCAGA GCAACAGTCT
601	651	701	751	801	851	901	951

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CTTTTCTGTG GAAAAGACAC	TGCGGCGACC ACGCCGCTGG	CCACATAGCA GGTGTATCGT		GCGAAAACTC CGCTTTTGAG	CCACTCGCGC GGTGAGCGCG	TCTGGGTGAG AGACCCACTC	GGCGACACGG CCGCTGTGCC	GAAGCATTTA
CCGTAAGATG GGCATTCTAC	GAATAGTGTA CTTATCACAT	TAATACCGCG	? }	GTTCTTCGGG	TCGATGTAAC AGCTACATTG	CACCAGCGTT GTGGTCGCAA	AGGGAATAAG TCCCTTATTC	CAATATTATT
lules and pCAL vectors (co GTCATGCCAT CAGTACGGTA	GTCATTCTGA CAGTAAGACT	CAATACGGGA GTTATGCCCT	IrmX	ATTGGAAAAC TAACCTTTTG	GAGATCCAGT CTCTAGGTCA	CTTTTACTTT GAAAATGAAA	GCCGCAAAAA CGGCGTTTTT	CTTCCTTTTT
Iditional pCAL vector mod TTCTCTT'ACT AAGAGAA'TGA	ACTCAACCAA TGAGTTGGTT	GAGTTGCTCT TGCCCGGCGT CTCAACGAGA ACGGGCCGCA		AGTGCTCATC TCACGAGTAG	TACCGCTGTT ATGGCGACAA	TCCTCAGCAT AGGAGTCGTA	AAGGCAAAAT TTCCGTTTTA	TACTCATACT
Figure 35a: Functional maps and sequences of additional pCAL vector modules and pCAL vectors (continued) 1001 CACTGCATAA TTCTCTT!ACT GTCATGCCAT CCG' GTGACGTATT AAGAGAATGA CAGTACGGTA GGC	ACTGGTGAGT TGACCACTCA	GAGTTGCTCT CTCAACGAGA		GAACTTTAAA CTTGAAATTT	TCAAGGATCT AGTTCCTAGA	ACCCAACTGA TGGGTTGACT	CAAAAACAGG GTTTTTGTCC	AAATGTTGAA
sa: Functional 1001	1051	11.01		1151	1201	1251	1301	1351
gure 3!			SUB	STIŢŪTE SH	EET (RULE :	26)		
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GTTATAATAA CTTCGTAAAT Figure 35a: Functional maps and sequences of additional pCAL vector modules and pCAL vectors (continued) GAAGGAAAAA TTTACAACTT ATGAGTATGA

BsrGI

1401	TCAGGGTTAT AGTCCCAATA	TGTCTCATGA ACAGAGTACT	GCGGATACAT CGCCTATGTA	ATTTGAATGT TAAACTTACA	ACATGAAATT TGTACTTTAA	
1451	GTAAACGTTA	ATATTTTGTT	AAAATTCGCG TTAAATTTTT TTTTAAAAA	TTTTTTTTTT	GTTAAATCAG CAATTTAGTC	

TATAAATCAA ATATTTAGTT	GAACAAGAGT
CAAAATCCCT TATAAATCAA GTTTTAGGGA ATATTTAGTT	TTCCAGTTTG
CCGAAATCGG GGCTTTAGCC	TTGAGTGTTG
AACCAATAGG TTGGTTATCC	CGAGATAGGG
CTCATTTTTT GAGTAAAAA	AAGAATAGAC
1501	1551

•	A AAACCGTCTA
	AAAGGGCGAA
	CTCCAACGTC
	AGAACGTGGA
	CCACTATTAA
	1601

CTTGTTCTCA

AAGGTCAAAC

AACTCACAAC

GCTCTATCCC

: ACCCTAATCA AGTTTTTTGG	TGGGATTAGT TCAAAAAACC
GGCCCACTAC GAGAACCATC ACCCTAATCA	CTCTTGGTAG TGGGATT
GGCCCACTAC	CCGGGTGATG
TCAGGGCGAT	AGTCCCGCTA
1651	

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1551

AAGAATAGAC TTCTTATCTG

AGG GAGCCCCCGA TCC CTCGGGGGCT	GAA AGGAAGGGAA	GTA GCGGTCACGC	GCT ACAGGGCGCG	CTGA TGAGGGTGTC	AgeI	ZACC GGTGCGTCAG STGG CCACGCAGTC	CTCA CTGACTCGCT
ntinued) ACCCTAAAGG TGGGATTTCC	GTGGCGAGAA	GGCAAGTGTA CCGTTCACAT	ATGCGCCGCT _TACGCGGCGA	TTGGCACTGA		AGGCTGCACC TCCGACGTGG	TCCTCGCTCA
ules and pCAL vectors fco CTAAATCGGA GATTTAGCCT	GCCGGCGAAC CGGCCGCTTG	CTAGGGCGCT GATCCCGCGA	GCCGCGCTTA	GCTTACTATG CGAATGATAC		AGGAGAAAAA TCCTCTTTTT	ATATTCCGCT
itional pCAL vector modu CCGTAAAGCA GGCATTTCGT	GACGGGGAAA CTGCCCCTTT	GGAGCGGGCG	CACCACACCC GTGGTGTGGG	GTGTATACTG CACATATGAC		TTCATGTGGC AAGTACACCG	GATACAGGAT
Figure 35a: Functional maps and sequences of additional pCAL vector modules and pCAL vectors (continued) 1701 GGTCGAGGTG CCGTAAAGCA CTAAATCGGA ACC( CCAGCTCCAC GGCATTTCGT GATTTAGCCT TGG(	TTTAGAGCTT AAATCTCGAA	GAAAGCGAAA CTTTCGCTTT	TGCGCGTAAC ACGCGCATTG	NheI ~~~~~~ TGCTAGCGGA ACGATCGCCT	XmnI	AGTGAAGTGC TCACTTCACG	CAGAATATGT
35a: Functional 1701	1751	1801	1851	190.1		1951	2001
Figure			SUBSTITU	JTE SHEET (RULE 26) 180 / 204			

Figure 35a: Functional maps and sequences of additional pCAL vector modules and pCAL vectors (continued)

	2051	ACGCTCGGTC TGCGAGCCAG	GTTCGACTGC CAAGCTGACG	GGCGAGCGGA CCGCTCGCCT	AATGGCTTAC TTACCGAATG	GAACGGGGCG	
	2101	GAGATTTCCT CTCTAAAGGA	GGAAGATGCC CCTTCTACGG	AGGAAGATAC TCCTTCTATG	TTAACAGGGA AATTGTCCCT	AGTGAGAGGG TCACTCTCCC	
c	2151	CCGCGGCAAA	GCCGTTTTTC CGGCAAAAAG	CATAGGCTCC GTATCCGAGG	GCCCCCCTGA CGGGGGGACT	CAAGCATCAC GTTCGTAGTG	
HIRCTITI ITE	2201	GAAATCTGAC CTTTAGACTG	GCTCAAATCA CGAGTTTAGT	GTGGTGGCGA	AACCCGACAG TTGGGCTGTC	GACTATAAAG CTGATATTTC	
CUEET /DUI	2251	ATACCAGGCG TATGGTCCGC	TTTCCCCCTG AAAGGGGGGAC	GCGGCTCCCT	CCTGCGCTCT GGACGCGAGA	CCTGTTCCTG GGACAAGGAC	
E 00\		·	AgeI				
	2301	CCTTTCGGTT GGAAAGCCAA	TACCGGTGTC	ATTCCGCTGT TAAGGCGACA	TATGGCCGCG	TTTGTCTCAT AAACAGAGTA	
	2351	TCCACGCCTG AGGTGCGGAC	ACACTCAGTT TGTGAGTCAA	CCGGGTAGGC	AGTTCGCTCC TCAAGCGAGG	AAGCTGGACT	

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onal maps and sequences of additional pCAL vector modules and pCAL vectors (continued)	
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ATGCGCCGGT TACGCGGCCA	AATTGATTTA GAGGAGTTAG TCTTGAAGTC ATGCGCCGGT TTAACTAAAT CTCCTCAATC AGAACTTCAG TACGCGGCCA	GAGGAGTTAG CTCCTCAATC	AATTGATTTA TTAACTAAAT	AGCCACTGGT TCGGTGACCA	2501
CACTGGCAGC	AGTCCAACCC GGAAAGACAT GCAAAAGCAC CACTGGCAGC TCAGGTTGGG CCTTTCTGTA CGTTTTCGTG GTGACCGTCG	GGAAAGACAT CCTTTCTGTA	AGTCCAACCC TCAGGTTGGG	TATCGTCTTG ATAGCAGAAC	2451
ATCCGGTAAC TAGGCCATTG	ACCCCCGTT CAGTCCGACC GCTGCGCCTT ATCCGGTAAC TGGGGGGCAA GTCAGGCTGG CGACGCGGAA TAGGCCATTG	ACCCCCGGTT CAGTCCGACC TGGGGGGCAA GTCAGGCTGG	ACCCCCCGTT TGGGGGGCAA	GTATGCACGA	2401

GAAAAACCGC	GCGCAGACCA CGCGTCTGGT
GAGAACCTAC GAAAAACCGC CTCTTGGATG CTTTTTGGCG	AAGAGATTAC TTCTCTAATG
TGGTAGCTCA	TTTTCAGAGC AAGAGATTAC AAAAGTCTCG TTCTCTAATG
TTCAAAGAGT TGGTAGCTCA AAGTTTCTCA ACCATCGAGT	
GTTACCTCGG CAATGGAGCC	CCTGCAAGGC GGTTTTTTCG GGACGTTCCG CCAAAAAAGC

2651

2601

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GAGGTTCGGT

CTCCAAGCCA

GACTGCGCTC CTGACGCGAG

CTGAAAGGAC AAGTTTTAGT

TAAGGCTAAA ATTCCGATTT

2551

TTCAAAATCA

GACTTTCCTG

# BglII

TCTTATTA AGAATAAT AAGAAGATCA TTCTTCTAGT AAACGATCTC TTTGCTAGAG 2701

Figure 35b: List of oligonucleotides used for synthesis of modules

M1: PCR using template

NoVspAatII: TAGACGTC

M2: synthesis

BloxA-A: TATGAGATCTCATAACTTCGTATAATGTACGCTATACG-

**AAGTTAT** 

BloxA-B: TAATAACTTCGTATAGCATACATTATACGAAGTTATG-

**AGATCTCA** 

M3: PCR, NoVspAatll as second oligo

XloxS-muta: CATTTTTGCCCTCGTTATCTACGCATGCGATAACTTCGTA-

TAGCGTACATTATACGAAGTTATTCTAGACATGGTCATAGCTGTTTCCTG

M7-1: PCR

gIIINEW-fow: GGGGGGAATTCGGTGGTGGTGGATCTGCGTGCGCTG-

**AAACGGTTGAAAGTTG** 

gIIINEW-rev: CCCCCCAAGCTTATCAAGACTCCTTATTACG

M7-II: PCR

glllss-fow: GGGGGGGAATTCGGAGGCGGTTCCGGTGGTGGC

M7-III: PCR

glllsupernew-fow: GGGGGGGAATTCGAGCAGAAGCTGATCTCT-

GAGGAGGATCTGTAGGGTGGTGGCTCTGGTTCCGGTGATTTTG

Figure 35b: List of oligonucleotides used for synthesis of modules (continued)

M8: synthesis

lox514-A: CCATAACTTCGTATAATGTACGCTATACGAAGTTATA

lox514-B: AGCTTATAACTTCGTATAGCGTACATTATACGAAGT-

**TATGGCATG** 

M9II: synthesis

M9II-fow: AGCTTGACCTGTGAAGTGAAAAATGGCGCAGATT-

M9II-rev: GTACACCCCCCCAGGCCGGCCCCCCCCCTTTAA-

TTAAACGGCAGACAAAAAAAAATGTCGCACAATCTGCG

M10II: assembly PCR with template

bla-fow: GGGGGGGTGTACATTCAAATATGTATCCGCTCATG

bla-seq4: GGGTTACATCGAACTGGATCTC

bla1-muta: CCAGTTCGATGTAACCCACTCGCGCACCCAACTGATC-

CTCAGCATCTTTACTTTCACC

blall-muta: ACTCTAGCTTCCCGGCAACAGTTAATAGACTGGATG-

GAGGCGG

bla-NEW: CTGTTGCCGGGAAGCTAGAGTAAG

bla-rev: CCCCCCTTAATTAAGGGGGGGGGCCGGCCATTATCAAA-

AAGGATCTCAAGAAGATCC

M11II/III: PCR, site-directed mutagenesis

Figure 35b: List of oligonucleotides used for synthesis of modules (continued)

f1-fow: GGGGGGGCTAGCACGCCCCTGTAGCGGCGCATTAA

f1-rev: CCCCCCTGTACATGAAATTGTAAACGTTAATATTTTG

f1-t133.muta: GGGCGATGGCCCACTACGAGAACCATCACCCTAATC

### M12: assembly PCR using template

p15-fow: GGGGGGAGATCTAATAAGATGATCTTCTTGAG

p15-NEWI: GAGTTGGTAGCTCAGAGAACCTACGAAAAACCGCCCTG-

CAAGGCG

p15-NEWII: GTAGGTTCTCTGAGCTACCAACTC

p15-NEWIII: GTTTCCCCCTGGCGCTCCCTCCTGCGCTCTCCTGTTCCT-

GCC

p15-NEWIV: AGGAGGGAGCCGCCAGGGGGAAAC

p15-rev: GACATCAGCGCTAGCGGAGTGTATAC

#### M13: synthesis

BloxXB-A: GATCTCATAACTTCGTATAATGTATGCTATACGAAGTTA-

TTCA

BloxXB-B: GATCTGAATAACTTCGTATAGCATACATTATACGAAGTTA-

**TGAGA** 

#### M14-Ext2: PCR, site-directed mutagenesis

Colext2-fow: GGGGGGGAGATCTGACCAAAATCCCTTAACGTGAG

Col-mutal: GGTATCTGCGCTCTGCTGTAGCCAGTTACCTTCGG

Figure 35b: List of oligonucleotides used for synthesis of modules (continued)

Col-rev: CCCCCCGCTAGCCATGTGAGCAAAAGGCCAGCAA

M17: assembly PCR using template

CAT-1: GGGACGTCGGGTGAGGTTCCAAC

CAT-2: CCATACGGAACTCCGGGTGAGCATTCATC

CAT-3: CCGGAGTTCCGTATGG

CAT-4: ACGTTTAAATCAAAACTGG

CAT-5: CCAGTTTTGATTTAAACGTAGCCAATATGGACAACTTCTTC-

GCCCCGTTTTCACTATGGGCAAATATT

CAT-6: GGAAGATCTAGCACCAGGCGTTTAAG

M41: assembly PCR using template

LAC1: GAGGCCGGCCATCGAATGGCGCAAAAC

LAC2: CGCGTACCGTCCTCATGGGAGAAAATAATAC

LAC3: CCATGAGGACGGTACGCGACTGGGCGTGGAGCATCTGGTCGCA-

TTGGGTCACCAGCAAATCCGCTGTTAGCTGGCCCATTAAG

IAC4: GTCAGCGGCGGGATATAACATGAGCTGTCCTCGGTATCGTCG

LAC5: GTTATATCCCGCCGCTGACCACCATCAAAC

LAC6: CATCAGTGAATCGGCCAACGCGCGGGGAGAGGCGGTTTGCGT4TTG-

**GGAGCCAGGGTGGTTTTTC** 

LAC7: GGTTAATTAACCTCACTGCCCGCTTTCCAGTCGGGAAACCTGTCGTGCC-

AGCTGCATCAGTGAATCGGCCAAC

M41-MCS-fow: CTAGACTAGTGTTTAAACCGGACCGGGGGGGGGCTT-

AAGGGGGGGGGGG

Figure 35b: List of oligonucleotides used for synthesis of modules (continued)

M41-MCS-rev: CTAGCCCCCCCCCCCTTAAGCCCCCCCCGGTCCGGT-

TTAAACACTAGT

M41-fow: CTAGACTAGTGTTTAAACCGGACCGGGGGGGGGGCTTAA-

GGGGGGGGGGG

M41-rev: CCCCCCTTAAGTGGGCTGCAAAACAAACGGCCTCC-

TGTCAGGAAGCCGCTTTTATCGGGTAGCCTCACTGCCCGCTTTCC

M41-A2: GTTGTTGTGCCACGCGGTTAGGAATGTAATTCAGCTCCGC

M41-B1: AACCGCGTGGCACAACAAC

M41-B2: CTTCGTTCTACCATCGACACGACCACGCTGGCACCCAGTTG

M41-C1: GTGTCGATGGTAGAACGAAG

M41-CII: CCACAGCAATAGCATCCTGGTCATCCAGCGGATAGTT-

AATAATCAGCCCACTGACACGTTGCGCGAG

M41-DI: GACCAGGATGCTATTGCTGTGG

M41-DII: CAGCGCGATTTGCTGGTGGCCCAATGCGACCAGATGC

M41-EI: CACCAGCAAATCGCGCTG

M41-EII: CCCGGACTCGGTAATGGCACGCATTGCGCCCAGCGCC

M41-FI: GCCATTACCGAGTCCGGG

M42: synthesis

Eco-H5-Hind-fow: AATTCCACCATCACCATTGACGTCTA

Eco-H5-Hind-rev: AGCTTAGACGTCAATGGTGATGATGGTGG

Figure 36: functional map and sequence of ß-lactamase-MCS module

Bbe I (1361) Ase I (1364) Eco 57I (1366) Xho I (1371) Bss HII (1376) Bbs I (1386) Bsp EI (1397) Bsr GI (1403)	
Bam H I (192) Pst I (1356) Kpn I (202) Bss SI (1346) Fsc I (210) Eag I (1340) -35 (bla) bla-term bla-term	bla MCS 1289 bp
Pml 1 (189) Bsa Bl (182) Nsp V (173) Bsi Wl (166) Eco O109l (161) Psp 5ll (161) Sty I (157) Msc I (156) Bst XI (152) Bst Ell (140) Bst Bsu 36l (136)	Mlu I (126)

AAAAGGATCT TTTTCCTAGA

GAGATTATCA

TTTTGGTCAT

CGTTAAGGGA

CGAAAACTCA GCTTTTGAGT

276

Figure 36: functional map and sequence of B-lactamase-MCS module (continued)

16 16		AAGCCCCTGG CCAAGGTCCC GTACGTTCGA		TTA TCAAAAAGGA AAT AGTTTTTCCT	ACG CTCAGTGGAA
StyI PSp5II ————————— ECOO109I		CCAAGGTC	FseI	CCGGCCATTA	GGGTCTGACG CCCAGACTGC
BstXI		AAGCCCCTGG CCAAGGTCCC TTCGGGGACC GGTTCCAGGG	KpnI	CGGTACCAGG CCGGCCATTA GCCATGGTCC GGCCGGTAAT	CTTTTCTACG GAAAAGATGC
36I	tBI	TCAGGTGACC AGTCCACTGG	Pmli	CACGTGGATC GTGCACCTAG	ATCCTTTGAT TAGGAAACTA
BS		CGCGTTAACC GCGCAATTGG		AGATTACCAT TCTAATGGTA	TCTCAAGAAG AGAGTTCTTC
		126		176	226

Figure 36: functional map and sequence of B-lactamase-MCS module (continued)

326	TCACCTAGAT	CCTTTTAAAT	TAAAAATGAA	GTTTTAAATC	AATCTAAAGT
	AGTGGATCTA	GGAAAATTTA	ATTTTTACTT	CAAAATTTAG	TTAGATTTCA
376	ATATATGAGT	AAACTTGGTC	TGACAGTTAC	CAATGCTTAA	TCAGTGAGGC
	TATATACTCA	TTTGAACCAG	ACTGTCAATG	GTTACGAATT	AGTCACTCCG
426	ACCTATCTCA	GCGATCTGTC	TATTTCGTTC	ATCCATAGTT	GCCTGACTCC
	TGGATAGAGT	CGCTAGACAG	ATAAAGCAAG	TAGGTATCAA	CGGACTGAGG
476	CCGTCGTGTA	GATAACTACG CTATTGATGC	ATACGGGAGG TATGCCCTCC	GCTTACCATC CGAATGGTAG	TGGCCCCAGT ACCGGGGTCA
526	GCTGCAATGA	TACCGCGAGA	CCCACGCTCA	CCGGCTCCAG	ATTTATCAGC
	CGACGTTACT	ATGGCGCTCT	GGGTGCGAGT	GGCCGAGGTC	TAAATAGTCG
576	AATAAACCAG TTATTTGGTC	CCAGCCGGAA GGTCGGCCTT	GGGCCGAGCG	CAGAAGTGGT GTCTTCACCA	CCTGCAACTT GGACGTTGAA
929	TATCCGCCTC ATAGGCGGAG	CATCCAGTCT	ATTAACTGTT TAATTGACAA	GCCGGGAAGC	TAGAGTAAGT ATCTCATTCA
9 2 9	AGTTCGCCAG TCAAGCGGTC	TTAATAGTTT AATTATCAAA	GCGCAACGTT CGCGTTGCAA	GTTGCCATTG	CTACAGGCAT GATGTCCGTA

Figure 36: functional map and sequence of B-lactamase-MCS module (continued)

TCCC AGGG	GGTT CCAA	TGTT	CCAT	CTGA	GGGA	AAAC	CAGT
TCCGGTTCCC	AAAAGCGGTT	CCGCAGTGTT	GTCATGCCAT	GTCATTCTGA	CAATACGGGA	ATTGGAAAAC	GAGATCCAGT
	TTTTCGCCAA	GGCGTCACAA	CAGTACGGTA	CAGTAAGACT	GTTATGCCCT	TAACCTTTTG	CTCTAGGTCA
TTCATTCAGC	TGTTGTGCAA	AGTAAGTTGG	TTCTCTTACT	ACTCAACCAA	TGCCCGGCGT	AGTGCTCATC	TACCGCTGTT
AAGTAAGTCG	ACAACACGTT	TCATTCAACC	AAGAGAATGA	TGAGTTGGTT		TCACGAGTAG	ATGGCGACAA
TTGGTATGGC	TGATCCCCCA	CGTTGTCAGA	CACTGCATAA	ACTGGTGAGT	GAGTTGCTCT	GAACTTTAAA	TCAAGGATCT
AACCATACCG		GCAACAGTCT	GTGACGTATT	TGACCACTCA	CTCAACGAGA	ÇTTGAAATTT	AGTTCCTAGA
CGCTCGTCGT	GCGAGTTACA	GTCCTCCGAT	GTTATGGCAG	CTTTTCTGTG	TGCGGCGACC	CCACATAGCA	GCGAAAACTC
GCGAGCAGCA	CGCTCAATGT	CAGGAGGCTA		GAAAAGACAC	ACGCCGCTGG	GGTGTATCGT	CGCTTTTGAG
CGTGGTGTCA	AACGATCAAG	AGCTCCTTCG	ATCACTCATG	CCGTAAGATG	GAATAGTGTA	TAATACCGCG	GTTCTTCGGG
	TTGCTAGTTC	TCGAGGAAGC	TAGTGAGTAC	GGCATTCTAC	CTTATCACAT	ATTATGGCGC	CAAGAAGCCC
726	176	826	876	926	916	1026	1076

Figure 36: functional map and sequence of B-lactamase-MCS module (continued)

1126	5 6	TCGATGTAAC AGCTACATTG	CCACTCGTGC GGTGAGCACG BSSSI	ACCCAACTGA TGGGTTGACT	TCTTCAGCAT AGAAGTCGTA Eco57I	CTTTTACTTT GAAAATGAAA
1176	9 /	CACCAGCGTT GTGGTCGCAA	TCTGGGTGAG	CAAAAACAGG GTTTTTGTCC	AAGGCAAAAT TTCCGTTTTA	GCCGCAAAAA CGGCGTTTTT
12	1226	AGGGAATAAG TCCCTTATTC	GGCGACACGG CCGCTGTGCC	AAATGTTGAA TTTACAACTT	TACTCATACT ATGAGTATGA	CTTCCTTTTT GAAGGAAAAA
12	1276	CAATATTATT GTTATAATAA	GAAGCATTTA CTTCGTAAAT	TCAGGGTTAT AGTCCCAATA	TGTCTCATGA ACAGAGTACT	GCGGATACAT
				PstI	Į	XhoI
		-	EagI		Bbel Asel	BSSHI
13	1326	ATTTGAATGT TAAACTTACA	ACTCGGCCGC TGAGCCGGCG	ACGAGCTGCA	GGCGCCATTA	ATGGCTCGAG
		BSSHII		BspEI BsrGI	H	

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	CATGAAATT	GTACTTTAA		
module (continued)	TCCGGATGTA	AGGCCTACAT	,	<b>?</b>
ence of I3-lactamase-MLS	CGCTTTGTCT	GCGAAACAGA	BbsI	~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~
igure 36: functional map and sequence of I3-lactamase-MLS module (continued)	CGCGCTTCAG CGCTTTGTCT TCCGGATGTA CATGAAATT	GCGCGAAGTC GCGAAACAGA AGGCCTACAT GTACTTTAA	Eco57I	?
igure 36:	76			

Figure 37: Oligo and primer design for  $V\kappa$  CDR3 libraries

		<del></del>									10							
O_K3L_5	5'-	G	С	C	C	T	G	C	Α	Α	G	Ċ	GG	Α	Α	G	Α	C
															Bb	sl		
			•	*										E	-		D	
Vk1 & Vk3	5'-	G	C	C	C	T	G	C	Α	Α	G	C	GG	Α	Α	G	Α	$\overline{\mathbb{C}}$
														E		•	D	
Vk2	5'-	G	C	C	Ċ	T	G	C	Α	Α	G	Ċ	GG	Α	Α	G	Α	C
														E			D	
Vk4	5'-	G	C	$\mathbf{C}$	C	Т	G	C	Α	Α	G	C	GG	A	A	G	A	$\overline{C}$

Figure 37: Oligo and primer design for Vk CDR3 libraries

30 20 -3'  $\cdot$   $\sigma$ CA TTATTGC GCGACI G CAGGGCGTG G CAGGCGGTGTA G Α C D E G Н CAK M N P CAG R

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S T V W Y

80% Q

Figure 37: Oligo and primer design for Vk CDR3 libraries

G A C C T

G A C C T
G A C C T

GCT GC GC GA G GAT G Α GA A G A G GA G G A G GG G G GGT G G G CA A T Ā AA G A G G G AAT Α Α CCCT G CA CAG CG CG Α G TG GG G G ΤA AT TAT 80% P 50% Y

Figure 37: Oligo and primer design for  $\mbox{V}\kappa$  CDR3 libraries

					70										80	81			
Α	Α	C	C	G	G	T	Α	Α	G	C	T	T	T	C	G	G	-5'	O_K3L_3	3
			M	scl														•	
F			G			0				_				_	_	^	0.1		
Ţ	T	G	G	<u>C</u>	<u>C</u>	A	T	T,	C	G	Α	Α	Α	G	C	C	-3.		
F			G			Q													
T	T	G	G	С	С	Α	T	T	C	G	A	A	Α	G	C	C	-3'		
F			G			Q									÷				
· T	T	G	G	C	C	Α	T	T	C	G	Α	Α	Α	G	C	C	-3'		

Figure 38: Oligo and primer design for VA CDR3 libraries

E D E A D
5'- C C T G C A A G C G G A A G A G C G G A T T -

Figure 38: Oligo and primer design for VA CDR3 libraries

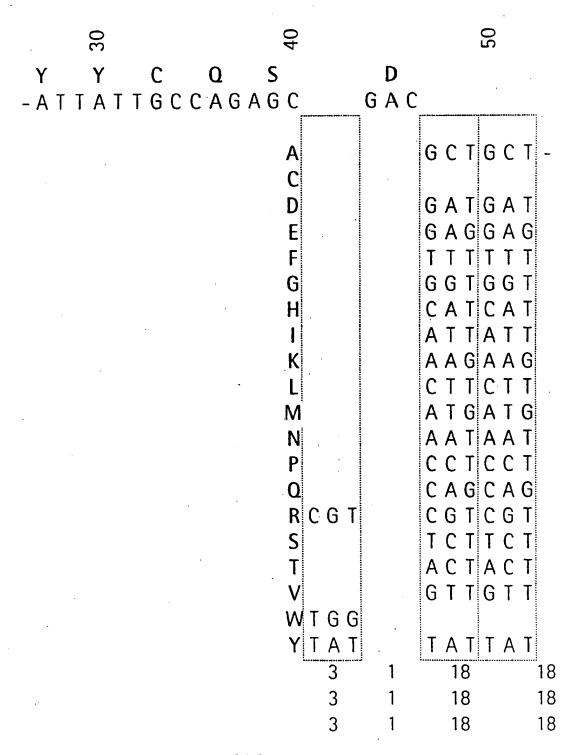


Figure 38: Oligo and primer design for V $\lambda$  CDR3 libraries

09	70	. 80
	G G G	
	G G C G G C G G (	CACGAAGTTA
gap gap		
- GCTGCTGCT		
GATGATGATGAT		
GAGGAGGAGGAG		
T T T T T T T T T T T T T T T T T T T	•	•
GGTGGTGGTGGT	<u> </u>	•
CATCATCATCAT	į	•
ATTATTATTAT	•	
AAGAAGAAGAAG		
CTTCTTCTTCT		
ATGATGATGAT(		•
AATAATAATAA		
C C T C C T	<b>;</b>	
CGTCGTCGTCG	•	
T C T T C T T C T T C	i	
ACTACTACTAC		
GTTGTTGTTGT	Γ	
TG	3	
TATTATTATTA	i	
18 19	3.32E+05	
18 18 19	5.98E+06	
18 18 18 19	1.08E+08	

Figure 38: Oligo and primer design for VA CDR3 libraries

T V L G Q E F
ACCGTTCTTGGCCAGGAATTCGAGCC-3'
3'-CCGGTCCTTAAGCTCGG-5'

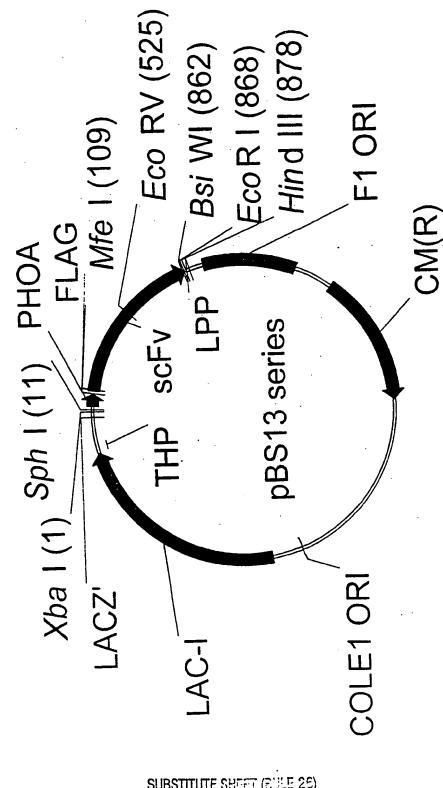


Figure 39: functional map of expression vector series pBS13

Figure 40: Expression data for HuCAL scFvs (pBS13, 30°C)

% soluble	잗	ζ2	$\mathcal{L}$	к4	71	77	λ3
H1A	61%	58%	52%	42%	%06	61%	%09
H18	39%	48%	0/099	48%	47%	39%	36%
H2	47%	57%	46%	49%	37%	36%	45%
H3	85%	67%	9/9/	61%	80%	71%	83%
H4	%69	52%	51%	44%	45%	33%	42%
H 72	49%	49%	46%	9/0/9	54%	46%	47%
9H	%06	58%	54%	47%	45%	50%	51%

Total amount	3	Ž	C	72	71	72	7
compared to H3K2	<u>-</u>		2	†	!	7.	3
H1A	289%	1	166%	272%		150%	78%
H18	219%		89%	139%	•	158%	101%
H2	186%	223%	208%	182%	126%	%09	97%
H3	20%		71%	54%		130%	47%
H4	37%	55%	%09	17%	•	107%	251%
H5	%86		167%	83%		128%	115%
9H	9/059		89%	109%	•	215%	278%

Figure 40: Expression data for HuCAL scFvs (pBS13, 30°C)

Soluble amount	,		ć	7.	71	7.2	73	
compared to H3K2	<del>-</del>	2	2		-₹	77		
H1A	191%	88%	121%	122%	26%	211%	76%	
H1B	124%	95%	83%	107%	79%	142%	29%	
H2	126%	204%	139%	130%	%99	20%	002	
H3	63%	ı	81%	49%	%69	143%	61%	
H4	40%	47%	49%	54%	95%	22%	125%	
H2	%69	158%	116%	%08	72%	84%	84%	
H6 85%	85%	122%	87%	17%	162%	162%	212%	
	McPC							
soluble	38%	,		·				
%H3k2 total	117%							
%H3k2 soluble	%69							